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MOTIVATIONS FOR SUBMARINE AQUISITIONS IN ASIA

by

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Submarine acquisitions are on the rise throughout Asia. This thesis examines the national motivations behind this trend in three cases: India, China and Japan. Four hypotheses - focusing on national security, factional interests, technological momentum and institutional theory - are utilized in order to gain insight into the decision making process surrounding submarine acquisitions. The development of a conventional submarine fleet is strongly influenced by national security issues. The remaining three factors are also present in each case of submarine acquisitions, but to a much lesser degree. Indian and Chinese nuclear submarine developments are difficult to justify based solely on security threats due to the submarine's lack of strategic integration and the availability of low cost conventional submarines to cover professed strategic interests. In each case, factional interests influenced the control of the nuclear programs, while at the decision-making level, nuclear submarines are perceived as an avenue to higher international standing or as a means to fulfilling the international role to which the country aspires.

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MOTIVATIONS FOR SUBMARINE ACQUISITIONS IN ASIA

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ABSTRACT

Submarine acquisitions are on the rise throughout Asia. This thesis examines the national motivations behind this trend in three cases: India, China and Japan. Four hypotheses - focusing on national security, factional interests, technological momentum and institutional theory - are utilized in order to gain insight into the decision making process surrounding submarine acquisitions. The development of a conventional submarine fleet is strongly influenced by national security issues. The remaining three factors are also present in each case of submarine acquisitions, but to a much lesser degree. Indian and Chinese nuclear submarine developments are difficult to justify based solely on security threats due to the submarine's lack of strategic integration and the availability of low cost conventional submarines to cover professed strategic interests. In each case, factional interests influenced the control of the nuclear programs, while at the decision-makig level, nuclear submarines are perceived as an avenue to higher international standing or as a means to fulfilling the international role to which the country aspires.

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EXECUTIVE SUMMARY

With naval expansion well underway throughout the Asia-Pacific region, the submarine is rapidly becoming a platform of choice. Of the nine Asian navies operating submarines today, eight are modernizing their fleets. These countries are India, China, Japan, South Korea, Taiwan, Indonesia, Australia, and Pakistan. This group will soon be joined by Singapore and Malaysia. As a part of the modernization trend, air independent propulsion will be tested in the Pacific adding to the current submarine capabilities. The acceleration in submarine acquisitions might be a temporary surge, or it might continue into the next century, but nevertheless, this region will be concerned with undersea warfare for many years to come. The motivations driving the current trend need to be understood in order to plan for an ever more complex undersea environment.

This thesis examines the influences driving submarine acquisitions through case studies of the three major Asian navies: India, China and Japan. Four hypotheses are used to gain insight into the decision-making process in each country:

- **National Security - Threat Based:** *The development of a submarine fleet is shaped by the security threats to its nation, as perceived by the state level decision makers as unitary, rational actors.*

- **Factional Interests:** *The development of the submarine fleet is shaped by factional interests within the state. The factional interest of concern will differ between nuclear and conventional submarines and will be a larger driving factor for the nuclear propulsion program.*

- **Technological Momentum:** *Technological momentum shapes the development of submarine construction. For a conventional program, this will be based on shipyard capacity, and for a nuclear program, it will be driven by the scientific community.*

- **Institutional Theory:** *The shaping of a nation's submarine fleet is based on the connection of the nation-state to the global cultural system defining national identities as well as appropriate or inappropriate behavior for a nation-state through the recognition of "status" and "norms."*

In each of the cases, this study examines the development of the submarine fleet from its inception to the present. Each hypothesis is evaluated in terms of its ability to explain the pace and scope of submarine investments in each country. The national security hypothesis examines the perception of threat and how a submarine fleet responds to that threat. Factional and technological arguments evaluate the decision making process looking at cost and benefits and how they relate to that country's national interests. Institutional theory is a less tangible explanation, but shows itself in the rhetoric surrounding submarine development. This comes out through statements indicating a symbolic or normative nature associated with the role or identity a nation feels that it holds in the international social structure.

The conclusions drawn in this study are split around nuclear and conventional platform types. In each country case study, the national security issues strongly influences the development of a conventional submarine fleet. India feels directly threatened by Pakistan and China. China utilized submarines as a layer of defense and as a means of creating a threat. Japan faced the largest submarine fleet in the Pacific in the form of the Soviet fleet. By itself, a threat based explanation is compelling, but it does not bring out other influences which impact fleet developments. The remaining three hypotheses are present in each case in a limited fashion. Indian ship building lobbied in support of acquisitions leading to indigenous construction. Chinese political factions constrained the *Romeo* building program, but with bureaucratic and technological momentum in place, these submarines continued to roll off the production lines. Japan's submarine fleet had to shaped to fit not only the threat but the constitutional constraints of article nine in order to meet defensive needs only. Through three decades, Japanese submarines have been upgraded through the return of civilian advances resulting from economic success.

The motivations driving nuclear submarine development differ from those influencing conventional submarine investments. The high cost of nuclear development could not be justified in the face of a limited strategic outlook and a low cost conventional

alternative. Neither case could use technological momentum in the initial phases as they each started from scratch and received no foreign assistance. For India, the nuclear establishment, led by the Bhaba Atomic Research Center, had significant influence over the beginnings of nuclear propulsion development. Chinese political factions were more concerned with program control than with program advancement causing delays. The linking factor between these cases is the value which each nation places upon nuclear submarine development. Mao Zedong went as far as to say that China "will have to build nuclear submarines even if it takes us 10,000 years!" For each nation, the addition of nuclear submarines is perceived as an avenue to higher international standing or as a means to fulfilling the international role to which the country aspires.

Understanding the motivations for submarine acquisitions and recognizing the trend of submarine proliferation are equally important. Even if the trend does not continue into the twenty-first century, the commitment to submarine operations is embedded in many Asian navies; thus undersea warfare will continue to be a concern throughout the Pacific Rim and Indian Ocean. Asia's submarines will again need to be modernized and replaced within another two decades, thus repeating this process all over again. Understanding the motivations will help us to understand how history might repeat itself.

I. INTRODUCTION

> To complete the three dimensional picture let us look at the deadliest of the class - the submarine. They are vessels of stealth, and visibility or presence is not their hallmark. They play a very crucial role in denying the use of the sea to the enemy.
> - Vice Admiral S. P. Govil, PVSM, AVSM (Retd) 1994

Undersea warfare has taken a significant shift in emphasis away from the old open ocean, deep water threat of the Soviet submarine fleet. The Pacific basin and Indian Ocean were ruled by the superpowers in terms of submarine warfare. As this contention fades, the void that has been created is being filled by other Asian navies. Although none of these fleets directly threaten the United States or its navy, U.S. interests can be found in every corner of this region.

The cold war is over, but submarine warfare is not dead. In the Pacific and Indian Oceans, nine navies are operating submarines and two more have approved acquisitions. Each of these fleets is currently modernizing its submarines through indigenous construction or foreign purchases. With Air Independent Propulsion on the horizon, conventional submarine modernization may soon close a portion of the gap with nuclear platforms. The most probable future battleground for submarines will be within littoral waters.[1] The Sea of Japan, South China Sea and Arabian Sea are three of the primary littoral regions of concern as delineated by the Office of Naval Intelligence.[2] This chapter expands upon how these regions have been affected by submarines in the past and establishes the major players operating submarines today.

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[1] For the purpose of this thesis, "littoral" is considered to include the shallow or constricted maritime regions characterized by poor acoustic conditions including high ambient noise and high reverberation.

[2] Office of Naval Intelligence, "The Submarine Threat in the Coming Decade" (Washington, DC: U.S. Government Printing Office, 1994): 10.

This thesis examines the submarine fleets of Asia and the processes through which they have developed. By exploring the decision making process in three main case studies, I determine whether the motivations for submarine development are consistent across various states and at what level these decisions are being made.

A. THEORY

To evaluate the driving motives behind the growth of a submarine fleet, four general hypotheses will be used, including some derived from the major theories of international relations. By viewing submarine development from these perspectives, additional insights can be gained about the actor's motivations. These hypotheses provide for different viewpoints in order to help with understanding overall submarine development. The first two hypotheses are drawn from the most common explanations for military build-ups, dealing with national security issues and internal factional interests. These possible explanations are all guided by the central principle of an unitary, rational actor. This assumes that, at some point, there must be a calculation, based upon the available information, of cost and benefit and a weighing of these to select the alternative which maximizes the outcome. The remaining hypotheses work on a systemic level reducing the decision maker's options. Different levels of decision making are separated in the hypotheses because they each create a unique prediction.

In working with single case studies, theories cannot be tested strictly due to the lack of a control case. For this work, the hypotheses are designed to provide different views or insights to understanding submarine acquisitions. The key to the method is that no single theory can stand alone throughout time. In each case study, the various influences interact and change as the submarine fleet develops.

1. Hypotheses[3]

a. National Security - Threat Based

The development of a submarine fleet is shaped by the security threats to its nation, as perceived by the state level decision makers as unitary, rational actors. National security issues are the easiest route to justifying an action. The creation and dissemination of a perceived security threat can provide the reasons behind taking a certain path. For the case of submarine procurement and development, the key issue is the development of a maritime threat or more importantly the perception of an undersea threat. This threat may be perceived to come from a neighboring state, regional actor or from a superpower. In evaluating this hypothesis, the response to the threat is the key in how well it is tailored to the nation's security needs. The primary mission for most large submarine fleets, including the U.S. submarines, has been anti-submarine warfare (ASW) with other uses such as anti-surface warfare (ASUW) or mining coming secondary. This may not be the case for smaller fleets. ASW needs cannot provide sufficient drive for the current trend in submarine developments worldwide. The multi-mission capability centering around the stealth of a submarine must be considered in evaluating a states reaction to a perceived threat and its motivation for submarine acquisition.

For the purpose of this case study, the maritime threat to a nation will be considered to include any country that is capable of moving naval forces into that nation's regional waters, and is perceived to have an intent to influence regional affairs. This threat is determined by monitoring the "international political-economic environment in an attempt to evaluate the scope and extent of potential threats that are posed by potential opponents."[4] Therefore, a nation's submarine fleet will be shaped by their perception of

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[3] One additional hypotheses centered on superpower influence was evaluated and discarded. The idea that the United States or Soviet Union provided motivational impetus behind submarine development did not prove to be significant for any of the case studies. The superpowers were influential in terms of perceived threat or as an arms supplier, but not in terms of directing another navy's submarine build-up.

the threat, or potential threat, created by outside naval influence in the region and the ability of the submarine to deter or counter that threat.

b. Factional Interests

The development of the submarine fleet is shaped by factional interests within the state. The factional interest of concern will differ between nuclear and conventional submarines and will be a larger driving factor for the nuclear propulsion program. The factional interest hypothesis is based around the idea that there exists, within the state, an internal group which holds significant enough influence to be able to push through programs which are of benefit to its own interests but not necessarily in line with the overall national interest. For submarine procurement and development, the possible factions which may exert this kind of influence would include the military hierarchy, the shipbuilding industry or the nuclear establishment.[5] To evaluate this hypothesis, it will be necessary to determine the benefits of the submarine program as compared to other alternatives.

c. Technological Momentum

Technological momentum shapes the development of submarine construction. For a conventional program, this will be based on shipyard capacity, and for a nuclear program, it will be driven by the scientific community. The technological momentum argument has very close ties to the organizational or bureaucratic arguments. This hypothesis has very different expectations when split around the conventional or nuclear programs. For a diesel submarine program, the shipyard capacity and training may be expanded to accommodate the indigenous construction of submarines. Technical momentum would be a matter of being forced to maintain the capacity and the knowledge levels to continue the construction process. Construction contracts have a large impact on

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[4] Michael Don Ward and A. K. Mahajan, "Defense Expenditures, Security Threats, and Government Deficits," *Journal of Conflict Resolution* 28, no. 3 (September 1984): 386.

[5] The shipbuilding industry would include all private or government groups supported through naval contracts. The nuclear establishment would include primarily the scientific community conducting research and development.

the local economy creating a need to maintain a consistent construction rate. Proof of this momentum would be tied to the lobby by the shipyard to maintain funds for construction. For a nuclear program, the technological momentum argument becomes much more compelling. The issue to be resolved is whether the nuclear propulsion program is the natural extension of nuclear power and nuclear weapons programs or is it a side program driven by a different issue.

d. Institutional Theory

The shaping of a nation's submarine fleet is based on the connection of the nation-state to the global cultural system defining national identities as well as appropriate or inappropriate behavior for a nation-state through the recognition of "status" and "norms." The final hypothesis centers around what Eyre and Suchman have described as "an alternative perspective" to the spread of high technology weaponry, institutional theory.[6] This argument emphasizes that programs such as submarine development may be driven by more than simply national security or rational choice calculations. They reduce the argument to say that weapons systems are pursued "not because of their match between technical capabilities and national security needs, but because of the highly symbolic, normative nature of militaries and their weaponry."[7] It is through a connection to the global system that a nation-state becomes infused with the standards and norms which it perceives as the appropriate behavior for an actor hold a certain identity in the global culture.

In addition to system influence, the drive for modernity creates "norms." To be considered a modern nation requires the existence of a modern navy. One avenue to a modern navy, without the expenditures for capital ships or weapons research and development, may be to purchase submarines. The next step to modernity could then be an

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[6] Dana P. Eyre and Mark C. Suchman, "Status, Norms and the Proliferation of Conventional Weapons: An Institutional Approach" in Peter J. Katzenstein, ed., *Culture and National Security* (Columbia University Press, forthcoming).

[7] Ibid., 9.

indigenous production program. Forty-four navies worldwide have added submarines to their order of battle making this a standard by which all navies may be judged. The nuclear powered submarine places a navy in an elite group surrounded by the United States, Russia, Great Britain and France, historically the maritime powers of recent centuries.

The institutionalization of submarines is particularly difficult to measure. Only through the examination of the previous theories can the possibility of the institutional argument be utilized in a single nation case study. Based on the strength of the alternatives, institutional theory draws insights on how a nation-state should act if it is concerned with fulfilling the roles of the identity it perceives itself to hold. In comparing hypotheses with equal evidence, institutional influences typically would be considered an underlying factor rather than a primary motivation.

B. SUBMARINES IN THE PACIFIC

The historical record can only provide impetus to the following submarine developments in Asia if the details are not examined closely. The numerous problems encountered by submariners during the Second World War should tend to deter submarine usage. A simple look would show the need to build a large force and the willingness to accept high losses. Both of these terms are difficult to swallow for any naval planner. If the accompanying tonnage of commercial shipping lost by both sides were not so high by 1945, the low success rate against military platforms would also be a deterrent. The position of economic prosperity in today's national strategies makes this fact important in force structure development.

1. Submarines in the World Wars

With the German adaptation of the diesel engine combined with electric powered propulsion in 1906, the submarine became a formidable factor in naval warfare. During World War I, German submarines, known as U-boats, were used extensively against the Allies and Atlantic shipping. Their success was phenomenal considering the limitations of

the ship and weapons designs. Admiral Doenitz of the German Navy described the U-boats of the First World War as "little more than intelligent mines."[8] Anti-submarine warfare (ASW) was ineffective until near the end of the war when ASW weapons, including depth charges, were developed.[9] Countering the U-boat had significant impact on the momentum in the Atlantic.

The First World War was the prototype for fleet submarine operations, but the Second World War brought their influence to the Pacific. The United States and Japan each had built sizable submarine fleets based on the reputation of German U-boats in the Atlantic. War plans were designed with submarines being utilized as support elements to the main battle fleet. Between the wars, the primary battle scenario of the U.S. Pacific fleet centered around taking the battle to the Far East, as envisaged by Plan *Orange*.[10] U.S. submarine designers concentrated on speed and propulsion to reduce transit times across the Pacific. By 1941, the result was the *Gato* class submarine, capable of 20 knots on the surface. The Japanese also looked for endurance in order to inhibit the U.S. fleet's transit through waves of forward deployed submarine attacks. [11]

The attack on Pearl Harbor changed the fate of submarines in the Pacific. Eighteen naval vessels were sunk or badly damaged, including eight battleships. Almost 200 American aircraft were destroyed, and approximately 3000 naval and military personnel were killed or wounded. Submarines were untouched by the Japanese attack. With the U.S. surface fleet incapable of going on the offensive for months, the submarine was the

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[8] Norman Friedman, *Submarine Design and Development* (Annapolis: Naval Institute Press, 1984), 27.

[9] Ibid., 32.

[10] Keith Wheeler, *War Under the Pacific* (Alexandria: Time-Life Books, 1980), 23. Plan Orange was the standby war plan against the Japanese. It incorporated an Army garrison holding the Philippines while the U.S. Pacific fleet could be augmented by the U.S. Atlantic fleet via the Panama Canal which would then sail together to the Philippines where it would defeat the Japanese fleet in a single battle.

[11] Friedman, *Submarine Design and Development,* 39.

only platform able to take the war to the Japanese. By the end of the war, submarines had proven quite successful in the Pacific, however the first deployments were not nearly so glorious. Many submarine commanders were relieved of command for lack of production due to conservative tactics and poor weapons usage.

There were two early problems for U.S. submarines in the Pacific. Strategic employment gave U.S. commanders limited opportunities for attack. Submarines were sortied to suspected Japanese staging areas and essentially had to wait for the enemy to come to them. Combined with an undetected flaw in the new Mark 14 torpedo's magnetic detonator, many patrols ended without a single successful attack.[12] By 1943, the submarines were being deployed to the concentrated shipping lanes created by Asian geography. Torpedo faults were overridden by changing the torpedo's depth setting to allow the magnetic detonator to be triggered. Slowly, patrol efficiencies began to rise. By the end of the war, the U.S. submarines in the Pacific had been so successful that they nearly eliminated their own mission by sinking all available Japanese merchants.

Japan's strategy for the war centered around the notion of a Greater East Asia Co-Prosperity Sphere. Japanese planners counted on the United States to be incapable of waging a two ocean war against Germany and Japan. The Japanese Empire was to be quickly expanded throughout East Asia in order to supply the war effort with raw materials. For the Imperial Navy, the goal was to engage and destroy the U.S. Pacific Fleet in a single decisive battle. Admiral Yamamoto conceived the surprise attack on Pearl Harbor as a means of crippling the U.S. fleet prior to leading it to its destruction.

The submarine fleet from Japan was intended to be used as an expendable first line of defense if the U.S. fleet were to launch an attack westward. Japanese submarines were to hinder the U.S. fleet's advance and then fall back and repeat the process. Japanese rules of engagement used submarines primarily for attacking enemy naval forces. Merchant

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[12] Wheeler, *War Under the Pacific,* 40-47.

ships were secondary targets which rated only a single torpedo, hit or miss.[13] This limitation on submarine utilization became a theme for Japanese submarines.

At Pearl Harbor, twenty-seven fleet submarines were positioned to attack U.S. ships attempting to escape the area. They recorded no kills. They were not involved in the fighting. Five midget submarines were also intended to wreak havoc between waves in the air raid. This mission was a complete failure. Only one of ten crewmen survived, and he became the first Japanese prisoner of war. While Pearl Harbor was a complete success for the attackers, its undersea complement began what would be a dismal time for its entire submarine force.

There were good reasons for the lack of production by Japanese submarines throughout the war. First, the only outstanding piece of equipment operated by the Japanese was the torpedo, which was designed for both high speed and long range. The primary disadvantage for the Japanese submarines came from the inability to design a high-powered transmitting tube for an accurate radar system, limiting search techniques to the visual range. Not until 1944 were Japan's submarines equipped with surface search radar. This factor alone gave the U.S. fleet a significant advantage.

Submarine warfare has significantly impacted the outcomes of two world wars. On both occasions, time was available to conduct attrition campaigns and shift the balance with brute force and emergent technologies. This type of warfare is unlikely to be seen again, but these wars provided launching points for submarine warfare. The first war proved the potential of the platform and generated the drive for improvement. By 1945, the submarine was solidly set into place alongside surface fleets and naval aviation.

2. Submarines in the Third World

Since the Second World War, the operational record of submarines in combat has been rather limited, but is most significant for the local conflicts in the Third World.[14]

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[13] Ibid., 97.

During the 1971 Indo-Pakistani War, the Indian frigate *Khurki* was sunk by a Pakistani submarine. Another Pakistani submarine, *PNS Ghali* was deployed into the Bay of Bengal, off shore of India's largest naval base at Vishkapatnam, but was sunk by Indian escorts. In 1973, Libyan leader, Colonel Gaddafi allegedly contracted an Egyptian submarine to torpedo the *Queen Elizabeth II* in route to Haifa with over six hundred American-Jews aboard. Egyptian President Anwar Sadat was able to head off this action even after the submarine had put to sea.[15]

The effectiveness of a single submarine in a littoral battlespace was illustrated during the Falklands War in 1982. The British Navy considered itself one of the premier ASW fleets of the world, but found that Argentina's single operational German designed *Type 209* submarine, the *San Luis*, operated by a relatively inexperienced crew, successfully eluded the entire British fleet. Even though the Argentine submarine was ineffective as an offensive platform, British fleet operations were disrupted as they expended over 200 ASW weapons (torpedoes and depth charges) on greater than 300 possible submerged contacts, of which less than a third were confirmed.[16] The unfamiliar acoustic environment rendered the British ASW fleet ineffective due to insufficient training in areas similar to the Falklands operating area.

3. Significance of Conventional Submarines

There are three reasons why conventional submarines are effective military platforms in an ocean previously dominated by the nuclear submarine: 1) the conventional submarine running on battery is extremely quiet and difficult to track passively as compared to the nuclear reactor which requires support equipment to run continuously; 2) the smaller hull of a diesel submarine presents a smaller active target cross-section and

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[14] Andres de Lionis, "Anti-Submarine Warfare in the Third World," *Jane's Intelligence Review* (April 1994): 188.

[15] Ibid., 188.

[16] James Fitzgerald and John Benedict, "There is a Submarine Threat," *Proceedings* X, no. x (August 1990): 63.

hence less active return; and 3) in the coastal regions, the acoustic environment creates false targets due to reverberation or masks a contact due to high ambient and shipping noise. This is where the conventional submarines are most likely to be operated due to speed and range limitations.[17]

The existence of even poorly trained and equipped submarine forces must be considered a threat at some level. The alleged incident with *Queen Elizabeth II* exhibits the value of a submarine in state sponsored terrorism. This event also correlates to the ease with which commerce raiding could be conducted by crews with limited training. The developing Asian navies are modernizing and developing superior forces as compared to those exhibited in the Indo-Pakistani conflict or Falklands War. Therefore, these forces must be evaluated as a potential threat.

Third World submarine fleets have two very different kinds of significance. According to Lionis, the Third World, including some developing regions of Asia, has the potential to become even more unstable in the future. Naval forces operating in these regions, for any mission, will have to account for the conventional submarine threat. Diesel-electric submarines are chosen as a low cost alternative to counter the high value ships of a major fleet, such as carriers or cruisers. Secondly, these small fleets will only grow. The Third World is the primary arms market for countries such as Russia and Germany, willing to negotiate sales throughout the world. No fewer than 44 countries maintain submarines, including: China, Japan, India, North Korea, South Korea, Taiwan, Pakistan, Indonesia and Australia (Singapore has ordered submarines and Malaysia is training submarine crews). Of the current and anticipated orders for naval vessels, Asian navies make up the majority of these orders.[18] Continued economic growth in this region

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[17] Friedman, *Submarine Design and Development,* 136. Hull size and design are primarily determined by the propulsion plant size.

[18] Stewart Walters, "Asia Aims Its Sights Underwater," *Asian Defence Journal* (June 1994): 53.

is expected to translate into some level of increased naval development, which will include undersea assets well beyond the current capability.

C. UNDERSEA WARFARE

Submarine warfare of the nineties bears little resemblance to the more commonly thought of world war or cold war operations. Even the employment of conventional submarines is changing today. These changes are a result of technology and the adaptation of advances to a submerged weapons platform. The fundamental operations for safely navigating a submarine have remained constant. The weapons and sensors operate in the same basic fashion as 1945, but have significantly improved. Torpedoes are smarter, and cruise missiles give a submarine greater stand-off range, while the basic principles are constant. Sonar systems are more sensitive, but submarines are much quieter. With the exception of cruise missile attacks, all submarine missions of today could have been executed in a limited manner four decades ago. The primary innovation which created the true submarine, with indefinite endurance, was the transition from diesel-electric to nuclear propulsion.

1. Conventional Submarines (SSK)

The design of the conventional submarine utilizes diesel engines to drive generators which in turn charge large storage batteries. Propulsion is drawn from an electrical motor turning the shaft. In some designs, a diesel engine may be available as an alternative to drive the shaft. The operation of a diesel requires an external source of oxygen. During the Second World War, the snorkel was developed to allow shallow submerged operation with only the snorkel pipe and a periscope breaking the surface. This greatly lowered the possibility of visual detection. Previously, snorkeling had to be completed at night to use the cover of darkness.[19]

Twenty years ago, a conventional submarine was required to snorkel at least once a day in order to recharge batteries. This evolution eliminated the primary advantage of a submarine. Snorkeling is an extremely noisy evolution thus giving up the submarine's position to any sonar system in the area. Another side effect of snorkeling is the reduced capability of own ship's sonar. The running diesel can mask other contacts in the area. This is both a tactical and ship's safety problem. Besides the noise issue, snorkeling places the submarine on or near the surface for extended periods of time, making it more vulnerable to visual detection than deep submergence operations. Speed is restricted to prevent mast damage, but this also prevents a submarine from continuing its transit and limits maneuverability. The length of time between charges can be extended through judicious use of the battery, including low speed operations and reduced internal electrical loading. Battery advancements have extended the period between required charges, but the need to snorkel remains the primary restriction on a commander's tactics. Other disadvantages of conventional submarines include low power capacity, limiting the systems which can be installed, and limitations on weapons load-outs, reducing platform firepower.

The diesel-electric submarine has many advantages as well. This lower cost platform is capable of carrying out multiple missions without exposing itself to detection. Current designs can stay at sea for up to fifty days and operate silent for as much as three to four days between snorkeling. Quiet operations at low speeds can be nearly undetectable by passive sonar. Battery operations do not require the operation of rotating equipment, a primary source of noise. In a battle scenario, a commander can shut down systems not needed for combat, making a submarine on batteries look, or sound, like a hole in the water. Additionally, the smaller hull of the conventional platform allows for greater maneuverability and less surface area to reflect active sonar emissions as described earlier.

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[19] John L. Byron, "Submarine," *International Military and Defense Encyclopedia*, vol. 5 (Washington: Brassey's Inc., 1993): 2589-93.

2. Nuclear Submarines (SSN or SSBN)

Nuclear propulsion eliminated the need for access to outside air, except for the comfort of the crew. In creating a larger power source, the reactor plant required additional support equipment. The basic operating principle behind submarine nuclear power is the nuclear fuel being controlled at critical mass and generating a heat source (or as we like to call it, 'making the rock hot'). The primary coolant, typically pure water, is cycled through the core and a secondary heat exchanger. This creates steam in a system isolated from the nuclear material, in order to drive propulsion and create electrical power via turbine generators. Under conditions where the reactor is unavailable to provide power, the submarine must operate in a manner similar to a conventional submarine, however battery capacity cannot support extended operations on the larger ship and may require diesel operations.

The nuclear propulsion plant is extremely demanding. The development of nuclear propulsion requires a national commitment to an expensive and demanding system. The design of the reactor must incorporate safeguards to prevent nuclear accidents. Personnel must be trained to operate and maintain the reactor to prevent the design safeguards from ever being needed.

The downside to nuclear power is in the many support systems needed. Each rotating pump is a potential sound source which must be isolated to prevent transmission of vibrations to the hull and into the surrounding waters. Propulsion is routed through a reduction gear in order to allow the propulsion turbine and the shaft to operate at their most efficient rates, but again this adds a potential noise source. The very system which creates the submarine's total stealth may in turn give it away.[20]

The advantages of nuclear propulsion go beyond the indefinite submerged operation. The reactor generates much greater propulsion increasing the top speed of the platform while allowing it to remain at this speed for extended periods. High speed transits

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[20] Ibid., 2591.

can be conducted to put a submarine at the scene of a crisis in minimal time without exposing the platform. The reactor dictates the need for a larger hull, which then allows for greater capacity for weapons, stores and personnel. The reactor provides a large power source capable of operating more sophisticated weapons and ship's control systems.

3. Air Independent Propulsion (AIP)

AIP is being designed as a means of closing the endurance gap between conventional and nuclear submarines. The principle behind AIP is to provide a low power electrical source to supplement the battery without the requirement of an external air source. Utilizing slow speed submerged operations, an AIP system is sufficient to maintain a full charge on the battery extending the time between snorkel operations up to two weeks or more.

Four primary designs have been considered by various builders. A closed-cycle diesel recycles its exhaust, by combining it with a mixture of oxygen and fuel to maintain a continuous, efficient combustion process. This process is limited by its need to store or discharge some portion of the exhaust. The key to air independence is in the use of liquid oxygen. Closed cycle diesels have been successful in extending submerged operations for up to three weeks in a small submersible. A second design, the Sterling engine is a reciprocating, external combustion engine. Unlike the common internal combustion engine, the Sterling engine utilizes continuous burning in an external chamber. The heated gases operate upon one of two thermodynamically linked pistons. The opposite piston's force is generated by a separate working gas (helium) which is heated and cooled through a regenerator/cooler. The gases are kept at pressure to facilitate overboard discharge. The key to the Sterling engine is again the use of liquid oxygen. Its primary advantage is that it is relatively quiet compared to a diesel, due to the lack of explosions and low engine revolutions per minute.[21]

The remaining forms of AIP differ greatly. The German Navy is attempting overcome the need for an oxygen source with fuel cell technology. Fuel cells do not require heat transfer or combustion. This process directly converts chemical reactions into electrical energy, with a potential up to five times greater than standard lead-acid batteries. The primary advantage of fuel cell technology is that it is virtually silent, operating without the need for rotating machinery. If current difficulties can be overcome, this method may provide upwards of a month of submerged, silent operations. The final and most expensive method is sometimes characterized as a "nuclear battery charger." A low power reactor, operating on the same principles as the main reactor for a SSN or SSBN could provide for virtually unlimited submerged operations at low speeds.[22]

These technologies are quickly becoming reality. The proliferation of these systems in new and upgraded conventional submarines will greatly change the ASW equation. Greater endurance and quieter operations present a challenge to anyone attempting to locate and track these platforms. Although AIP designs are being developed in Europe, the emerging arms market in Asia will be a primary sales target. Japan has begun testing of the Sterling design and Pakistan has ordered AIP equipped platforms from France. The original designs may not be Asian, but the application of AIP technology will have an impact on the undersea balance of Asia.

4. Acquisition Process

The submarine procurement process is broken down into three basic areas, operational need definition, infrastructure development and personnel training. The first phase of the process is carried out by all naval planners. In determining if need exists for submarine procurement, the planner must examine costs and benefits of a submarine program against maritime threats and national capabilities to establish a program. Within

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[21] Fitzgerald and Benedict, "There is a Sub Threat," 60-2.

[22] Ibid., 62.

these decisions, a navy will determine the specific submarine design to accept based on the expected operating environment, intended missions and cost. As is the case for many of the Asian-Pacific navies, I will assume the result of this process is to procure a submarine fleet of undetermined size.

The various submarine fleets of Asia range in size from two submarines in Indonesia to the eighty-four Chinese submarines. According to Henri Cazaban and Noel Clavelloux, in order to establish a cost effective fleet, the initial order should be at least three or four submarines. A fleet of two submarines may only be sufficient to provide training for local ASW forces. "Having four submarine also makes it possible to reach the submarine crew critical mass and trouble free-management."[23] The lower limit of four is based on a need to have two submarines operationally ready at all times.

a. Infrastructure needs

The typical process for fleet development begins with purchase of a submarine from an exporting country. However, long before the platform arrives, infrastructure should be developed to support the vessel. With the exception of Laos, each nation in this region has facilities capable of home porting a small conventional submarine. Docking and electrical requirements are very similar to the needs of a small surface combatant and could be quickly adapted to support a submarine.

Maintenance needs are a more difficult issue. An operational submarine requires periodic downtime to examine the ships hull and systems and to repair any problems. These refit periods are in addition to the normal repairs that occur during inport periods. Because an imported submarine cannot be returned to the manufacturer for repairs, naval infrastructure must be developed to carry out refits and repairs. Many of the technologies used on submarines are also utilized in modern surface ships and thus, the

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[23] Henri Cazaban and Noel Clavelloux, Interview with *Asian Defence Journal*, "Creating a Submarine Force - The French Way," *Asian Defence Journal* (August 1989) 47. Mr. Cazaban is the Head of the Directorate of Navy Shipbuilding of the French Ministry of Defence, Mr. Clavelloux is the Manager of the Systems and Weapons System Group of Thompson CSF's Electronic System Division.

base for a maintenance infrastructure may already be in place. However, the submarine-specific technologies dealing with hulls, deep submergence and diving-safety installations are crucial for crew safety. The primary technologies involved include specific forms of welding or precision machining for systems exposed to sea pressure. For navies developing nuclear propulsion, the list is expanded greatly to support the nuclear reactor and associated systems.[24]

One recent method to overcome the need to develop massive infrastructure has been the contracting of "through life support" from the builder, creating a relationship between the buyer and the prime contractor or sub-contractors. *Asian Defense Journal* quotes a Dutch naval consultant who emphasizes the need "for through-life support assistance...for the first seven years after the initial commissioning of the last submarine."[25] Assistance is intended to help the purchasing navy by keeping the vessels operational while supporting the transfer of maintenance capabilities to the purchaser. One common difficulty in this area is the transfer of adequate documentation. The drawings and specifications are crucial to the repair and upkeep of ships systems. The Royal Australian Navy still finds occasional problems in the documentation for the *Oberon* class, a British design, even as it comes to the end of its hull life.[26]

Indigenous construction of a submarine requires expansion of the above infrastructure. In most cases, this occurs through a phased building program. The first hulls may be built in the designers shipyard. Subsequent hulls are the constructed on site from prepackaged assemblies under the supervision of consultants from the builder in order to establish site expertise. Each subsequent hull is then built from a more basic package with the aim of a fully independent program.

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[24] Peter Lewis Young, "Submarine Procurement: Some Speculations on the Process of Buying a Submarine," *Asian Defence Journal* (June 1991) 16, and Cazaban and Clavelloux, "Creating a Submarine Force," 46.

[25] Young, "Submarine Procurement," 12.

[26] Ibid., 12.

b. Training needs

The training needs for a submarine fleet are divided into two areas, maintenance and operations. Training programs should encompass all aspects from basic systems design through advanced operations and maintenance. In order for a navy to acquire the expertise needed, the training process should begin in conjunction with the initial platform order. As a part of the purchase contract, personnel can be trained alongside the building country's navy or with a third party submarine force. The latter option is more likely to be chosen if the building navy does not operate the same submarines that are exported. For instance the German navy does not operate the *Type 209* as a part of its fleet, but rather uses the smaller *Type 205* or *206*. The local operating area may also be a factor in deciding where to train a crew. Beginning with no submarine experience, adequately training a full crew would take two to three years. To prepare the submarine commander may take as much as six years to develop tactical experience and submarine handling expertise.[27]

In addition to preparing a crew to receive a submarine, naval training must be developed to sustain crew turnovers. This level of training is accomplished through the development of a naval submarine school teaching all facets of submarine operations. Major requirements include the need for navigational, ship control and weapons systems simulators. Simulators are needed to train personnel in casualty or wartime situations which would be not only expensive, but too dangerous to conduct with the actual submarines.

5. Operating Areas

The operating areas expected for a submarine fleet will determine the submarine design best suited for that navy. Based on the area's characteristics, a navy may have to make trade-offs in maneuverability or range, based on the mission requirements.

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[27] Cazaban and Clavelloux, "Creating a Submarine Force," 47.

a. Deep Basins

The deep basins of the Pacific or Indian Oceans were the undersea battle space for the cold war. This is where nuclear powered submarines were best suited to operate. Large areas require the indefinite endurance and high speed capabilities of nuclear propulsion in order to conduct searches for other submarines. The acoustic characteristics of a deep basin are fairly consistent and provide for much longer range detection. The battle then became the quest to detect the enemy first and approach it without counter-detection by exploiting the acoustic environment. Environmental conditions can create areas from which a submarine can listen, but not be heard. Most important is maintaining position outside the enemy sensor's ability to detect your submarine.

b. Shallow Water/Coastal Regions

The shallow water regions, typical of the waters close to Asia, provide a very different challenge to the ASW problem. The ability for a submarine to gain long range passive detection of another submarine is nearly eliminated. The acoustic environment provides advantage to the evading platform. Ambient noise levels are high due to biologics and dense commercial shipping. Noise levels will tend to mask a relatively quiet submarine. Noise that is emitted is also difficult to track due to inconsistent acoustical environments. Active sonar tracking is equally limited by sound scattering, reverberation or bottom absorption. The small cross-sectional size of the conventional submarine hull adds to the difficulty of active detection due to a smaller return echo.

The submarine's size is important in the coastal regions. A smaller submarine will be more maneuverable and may be able to operate safer in dense shipping due to low vertical dimensions. The limited amount of water below the keel in shallow areas places safety restrictions on larger, in particular nuclear, submarines to prevent the submarine from impacting the ocean floor in the case of a ship control casualty.

D. SUBMARINE ORDER OF BATTLE IN ASIA

1. China

The People's Liberation Army - Navy (PLAN) has built the third largest submarine fleet in the world behind the United States and Russia. The majority of Chinese assets are very old and limited in their ability. Disregarding the *Romeo* class submarines, the PLAN has improved its modern platforms in the last decade through construction and purchase. The *Ming* class diesel submarines are beginning to fill the gap as the many older submarines decay. The purchase of three *Kilo* class submarines from Russia represents a large step in modernizing their fleet. The Chinese nuclear propulsion program is also gaining momentum after the difficulties of developing the first *Han* class SSN. Six nuclear propelled submarines are operating, including the *Xia* class ballistic missile submarine.

Chinese intentions to develop a blue water navy remain unclear, but the current actions in the South China Sea indicate their desire to control the seas regionally. The South China Sea is ideal for conventional submarine operations with the offensive advantages provided by the poor acoustic environment.[28]

2. India

India has developed a small conventional submarine fleet capable of enhancing India's goal of being the primary regional influence. India has proven the ability to build the German designed *Type 209/1500* at the Mazagon Docks near Bombay. They have also been provided the plans for constructing the *Kilo* class which they currently operate in the Bay of Bengal. The Indian submarine fleet consists of four *Shishumar* class (*Type 209*) and eight *Shankul* class (*Kilo*) submarines, all of which have been added since 1985. In addition, eight aging *Foxtrot* class submarines are nearing the end of operability and are

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[28] Acoustic systems capabilities are degraded for all platforms operating in these conditions giving the unit attempting to hide the significant advantage. If attempting ASW operations, the conventional submarine would be at the same disadvantage as a nuclear platform, assuming equivalent sonar equipment.

utilized primarily for training.[29] As the only Asian navy to have engaged in submarine combat since World War II, India can be counted on to maintain their submarine fleet to further their goal of a balanced naval force structure.

3. Japan

Japan's concern for the sea lines around Asia has solidified submarines in their naval strategy. The ineffective performance of World War II did not diminish the resolve to maintain a modern submarine fleet. For the past 25 years, Japanese construction has averaged almost one platform per year. Seven new designs have been developed over the past three decades. The current inventory of 19 submarines, all of Japanese design, is one of the world's most up-to-date SSK forces.

4. Other Asian Navies

In the power vacuum which developed after the naval pullouts from Subic Bay and Cam Ranh Bay, China and India may be the largest navies trying to fill the void, but the other nations are also developing in order to ensure their own security.

North Korea and South Korea each have submarine fleets. North Korea's submarines were supplied from the Soviet Union or China. They are now placing the emphasis on mini-submarines with purposes of mine warfare or ground force insertions. South Korea is one of the world's newest submarine manufacturers and operators. South Korean industry has built four *Type 209s* under license, and will produce five more by the end of the century. Although the two Korean fleets are built to counter each other, the eventual reunification of the Korean peninsula would combine two complimenting submarine forces and must be accounted for in long term planning.

Taiwan has maintained two *Guppy* class submarines and modernized them. In 1987, two Dutch submarines were transferred to Taiwan under protest from the People's

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[29] Richard Sharpe, ed., *Jane's Fighting Ships 1994-95*, (London, Jane's Defence Data, 1994): 280.

Republic of China (PRC). A subsequent order for additional hulls was then blocked by the PRC. Other avenues for submarine acquisition are still being pursued by Taiwan's navy.

Southeast Asia's position around the access to the Indian Ocean makes naval strategy important to many nations. Although Indonesia has typically placed their economy before the military, it has replaced its ineffective fleet of ex-Soviet *Whiskey* class submarines with the German *Type 209* design.[30] They have operated the first two since 1981, and upgraded them in 1989. Two additional platforms are on order for delivery before the turn of the century. New facilities are being built on Sumatra to support these submarines which will enhance their surveillance of the Strait of Malacca. Malaysia has approved the acquisition of two to four submarines, but had placed the order on hold due to budget constraints. Singapore's location makes it a primary candidate to operate submarines. After difficulties arose in negotiations with the German Navy, Singapore turned to Sweden for its submarine contacts. According to Walters, "Without a common enemy, and thus a common defense policy, there is too much at stake. Countries are still suspicious and ever watchful of naval purchases and improvements which could threaten their economic miracle."[31] Each country in Southeast Asia must determine how to meet its own perceived security threats, and submarines are becoming a popular option.

Pakistan has been a long-standing submarine operator with platforms provided by the French. Pakistan's professed rationale for its fleet is to counter Indian superiority. This premise continues as Pakistan modernizes its submarines through the acquisition of three AIP equipped French *Agosta-B* submarines.

This thesis will examine the motivational factors behind submarine acquisitions for India, the People's Republic of China and Japan. The hypotheses discussed earlier provide unique insights into each case study in order to further the overall understanding. The technological differences between nuclear and conventional submarines adds an additional

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[30] Ibid., 58.

[31] Ibid., 58.

facet to the study, as the motivations for acquiring these platforms are as different as the the submarines themselves.

II. INDIA

The development of a nuclear submarine by a nation characterized by a widely varied dual economy raises many questions as to why a country would take on a project of this magnitude. India's immense industrial complex is contrasted with a poor and inefficient agrarian sector. The massive population of India survives on a GNP per capita ranking India near the bottom in terms of this traditional indicator of development. A first glance analysis does not provide any answers for the motivation behind such an undertaking. Alongside its nuclear development, the Indian Navy has acquired the strongest conventional submarine fleet in the Indian Ocean.[32] This case study will distinguish the motivations behind these two programs and the differences between them.

The five major hypothesis from chapter one are analyzed. The conclusion varies around platform type, nuclear vs. conventional. An enormous program, such as naval nuclear propulsion, requires a great deal of momentum and funding. This case study shows that a factional interest group, the nuclear establishment in this case, is required to provide the push from below for funding and support. At the decision making level, or the political elite, the 'status' or high 'social value' associated with a nuclear submarine can justify the cost when security threats could be countered using lower cost alternatives.

The conventional diesel-electric submarine is an excellent instrument of the Navy for providing national security. The perceived and potential maritime threats to India all spell out the need for a balanced Navy with emphasis on subsurface warfare. Threat is not the only shaping factor for the submarine fleet. Proponents for the submarine community have been instrumental in the shaping of the force structure which has developed.

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[32] Richard Sharpe, ed., *Jane's Fighting Ships 1994-95* (London: Jane's Defence Data, 1994): 280-81.

A. INDIAN SUBMARINE PROCUREMENT AND DEVELOPMENT

After achieving independence from the British, and concentrating the majority of the defense budget on the land-based fighting capability, India passed through a period of naval build-up which was slow, and centered around what ships were available from the British Navy. With the additional fuel applied to the build-up of general forces following the conflict with the Chinese in 1962, the Navy benefited, as well as her sister services. The predominant supplier shifted to the Soviet Union. By the late 1970s, modern warships were being purchased from the Soviets, and to a lesser extent from Western Europe, to maintain balance in the name of non-alignment. As the Indian industrial base was able to absorb technology procured through the build-up, it was able to begin supplementing the purchases of naval platforms with indigenous construction.

All of the above policies were a matter of concern in the development of the Indian submarine fleet. India is the only navy in the world incorporating both Soviet and Western submarine technology. Between 1968 and 1975, India received eight *Foxtrot* class diesel submarines from the Soviet Union. These platforms have since deteriorated to a level of readiness only sufficient for training or minor deployments.[33] As spare parts became more difficult to procure from Russia, these submarines have been increasingly restricted to the pier and the first two hulls were cannibalized for parts. Of the remaining six, a maximum of three are seaworthy at any one time. Overall, the *Foxtrots* are declining. Only *INS Vagsheer* will undergo upgrades while the rest may be withdrawn from service by 1996.[34]

In 1981, the Indian Navy looked outside the Soviet Union and signed an agreement with Howaldtswerke (HDW) of West Germany for the addition of four *Type 209/1500* class diesel submarines.[35] The first two were purchased and delivered in 1987. The remainder of the agreement was for the construction of two additional boats at the

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[33] Ibid., 280-81.

[34] Ibid., 280.

[35] Ibid., 281.

Mazagon Dock Ltd. (MDL) in Bombay. All parts were supplied by HDW for their construction in Bombay. The contract provided for advisors and training for the Indian designers and shipbuilders. The construction process took over two years for each submarine. The period between launching and commissioning was longer than expected, but the lessons learned should be valuable in anticipating problems for future construction. Negotiations began for licensing of two additional *Type 209s* for MDL, but the contract was canceled by the Indians due to suspected corruption and charges of contract breeches over technology transfers.[36] In 1992, these issues were reconsidered and the fifth and sixth hulls were licensed. This platform adds significantly to the capability of the submarine fleet and will remain operational well into the next century.

Looking back to the Soviet Union, India was able to reach agreement over the purchase of the *Kilo* class diesel submarine. The *Kilo*s are the most advanced diesel boat built by the Soviets and represented a significant commitment to India. The first nation authorized to purchase this design, India acquired eight hulls between 1986 and 1991.

More important though is the lease of an ex-Soviet *Charlie-I* class nuclear powered cruise missile submarine. This remains the only instance of a nuclear submarine being transferred to another nation. The three year lease was not extended and the submarine was returned to Vladivostock in January 1991.

Although interest still exists within India for the purchase of a modern nuclear propelled guided missile submarine (SSGN), the Indian Navy has kept a nuclear propulsion program slowly simmering on the back burner for many years with moderate funding continuously available. A program for naval application of nuclear power began in 1971 by the civilian nuclear establishment in conjunction with the navy.[37] A number of reactors have been proposed, but have been put aside due design flaws. The workings of this bureaucracy, to be described later, have likely kept this program from getting off of

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[36] "Germany Loses Indian Subs," *Defense* (July 1988): 471.

[37] "Ordeal of a Navy Captain," *Hindu International* (3 December 1991): 4.

the ground, while still maintaining the lobby to keep moderate funding available. This program has received priority treatment over even the construction of an aircraft carrier. In the words of VADM Govil: "In the earlier days, we took what came, but today we endeavor to make what we want."[38] *Jane's Fighting Ships 1995-96* reports the Indian nuclear submarine program to have tested a shore based reactor and expects the first keel for an SSGN to be laid at Vishkapatnam by 1996. This activity is significant progress, but the launching of an SSGN will still be well into the future.

B. COMPARING NUCLEAR AND DIESEL SUBMARINES FOR INDIA

For each of the above hypotheses, the platform capability, cost or value can have an effect on the results of the study. In order to evaluate these arguments properly, the differences between a nuclear and conventional submarine must be laid out clearly. Chapter I contains a basic description of nuclear and conventional platforms and the areas in which they operate. The more intangible elements such as sound silencing or system performance are addressed, but are based on my opinions and limited experience and have only a minor input to the final results.

The two primary diesel hulls employed by the Indian Navy are the German *Type 209* and the ex-Soviet *Kilo* class submarines. The range of each of these platforms allows it to reach major choke points for entrance into the Indian Ocean, the Strait of Malacca, Red Sea, and the Strait of Hormuz, from any naval base in India. Deployments of this range would be limited by the ability to remain on station, depending significantly on the point of last replenishment. The *Kilo* would exert roughly half of its endurance in the five to seven day transit, leaving a approximately twenty days on station at five knots while snorkeling. The endurance will be altered if submerged transits are conducted at high speed. A commander's competence in use of the battery and propulsion significantly

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[38] Ibid., 18.

changes his ability to complete a mission. Fully submerged operations and particularly, sprints to position the boat tactically will affect time on station. The *Type 209* has twenty-five percent more range and higher speed improving its response and transit times. If surface transits are feasible, ranges are nearly doubled, but this eliminates most of the advantage gained by sending a submarine. In comparison, a nuclear submarine's endurance is not an issue. It can submerge directly after leaving port and remain undetected until it returns. Transit times are reduced by the higher transit speeds which can be maintained. Maneuvers on station do not limit endurance. The nuclear submarine is theoretically only restricted by its crew's ability to stay at sea.

According to *Jane's Fighting Ships 1994-95*, the types of weapons carried on any of these platforms will be fairly similar. The primary offensive and defensive weapon for a submarine is the torpedo. The *Kilo* carries a total of eighteen weapons, fourteen for the *Type 209*. One major difference between these designs is that the *Type 209* is capable of deploying external strap-on mines, where the Kilo must off-load torpedoes to accommodate this mission. The radar and fire control systems are of good quality but are likely limited by the level of upgrades provided by the suppliers. India's nuclear design will be modeled after the Soviet Charlie-I SSGN.[39] The major addition for this platform is its anti-surface warfare mission design, with externally mounted sub-surface to surface missile launchers. This mission capability enhances the ability of a single boat to control a choke point. The disadvantage is that external targeting assistance is required to take full advantage of this platform and as soon as an SSGN goes on the offensive, it must move to the defensive as its location has been given away with smoke trails pointing to the launch point.

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[39] Manoj Joshi, "Desperately Copying Charlie, India Designs Nuclear Submarine," *Times of India* (14 December 1994): 4.

C. TESTING THE HYPOTHESES

1. National Security - Threat Based

After the conflict with China in 1962 and the Indo-Pakistan War of 1971, India began to refocus its assessment of the security threats to the nation. Based on the "Cinderella" posture given to the navy prior to this, it was only feasible that any reassessment would have to raise the level of awareness to maritime security. The Indian subcontinent juts out with 7562 km of coastline, including islands, on the Bay of Bengal, Arabian Sea and Indian Ocean. The overseas trade of greater than Rs 40,000 crore (approx. US $25 billion) or 139 million tons of cargo emanates from the eleven major ports plus the over 200 medium and intermediate ports.[40] The development of the Exclusive Economic Zones (EEZ) created an additional region of 200 million sq. km for India's maritime control. However, seaborne economic assets cannot be considered solely as a determining factor for naval power or else countries such as Panama and Liberia would need enormous navies.

In addition to their own interests in this region, India must consider the presence of extra- regional navies which justify their presence via politico-economic-military terms.[41] "The use of coercive power by large navies was unambiguously established in 1971 by the *USS Enterprise* and it is only reasonable to expect an independent, nonaligned, nation-state like India to resist such infringement of its sovereignty."[42] During the cold war, the United States and Soviet Union played their game of presence and deterrence in the Indian Ocean. With the reduction to one superpower, there remains no solid check for the U.S. Navy's influence in the area. Additionally, the Peoples Liberation Army - Navy (PLAN)

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[40] C. Uday Bhaskar, "The Indian Navy: Rhetoric, Reality and Rationale," *Indian Defence Review*: 35.

[41] Ibid., 39.

[42] Ibid., 39.

has been making significant strides to extending their presence westward as will discussed later.

The responsibilities of the Indian Navy, as professed by senior Indian naval officials includes: protection of: 1) ports and sea lines of communication (SLOC); 2) the island territories; 3) fishery resources; 4) offshore oil installations; 5) Indian shipping and 6) seabed exploration.[43] Although there does not currently exist an outright and overt threat to India from the sea, the situation does not allow them to ignore possibilities. Because of the very long lead time to build up naval strength, "The size of the Navy should be determined by the country's geostrategic location, its self perceived role and the need for the growth of naval muscle, both qualitative and quantitative, in parallel with continuing expansion of its maritime assets."[44] Although the sea is open to all and the threat could come from many directions, India is shaping its naval force structure around those they perceive as possible adversaries.

a. Pakistan

In spite of the fact that the conflicts between India and Pakistan have been generally restricted to land, the Pakistanis do maintain a naval force capable of threatening India to some extent. If based on maritime affairs, the smaller coastline and single major port would dictate a force one- seventh the size of India. In contrast, the two navies will be closely equivalent based on expected receipts of surface combatants in Karachi.[45] Naval conflicts have been limited between these nations. In 1965, Pakistan gained a limited victory against an inept Indian force. By 1971, India was able to blockade and bombard Pakistan, both East and West. The sinking of the *PNS Ghali* was a victory, and illustrated a submarine's ability to threaten Vishkapatnam. Pakistan has since added new

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[43] S. P. Govil, "Why the Navy? Its Role and Responsibilities," *Indian Defence Review* 8, no. 3 (July 1993): 64.

[44] Ibid., 65.

[45] Bhaskar, "The Indian Navy," 39.

weapons systems including Exocet missiles on the Atlantique aircraft and submarine launched Harpoons. They are also attempting to acquire the Harpoon to be fitted to the P-3 Orion.[46] These weapons extend their strike capability, to threaten surface forces, oil platforms, port installations and merchant shipping as well as improving ASW capabilities.

Submarines play a crucial role in Pakistan's naval strategy, as a qualitative equalizing factor against the quantitative Indian superiority.[47] The Pakistani submarine fleet is much smaller, in numbers and ship design, but still holds the capacity to attack Indian assets, particularly through port mining operations and the new Harpoon capability. There are rumors over Pakistani requests for the purchase of a *Han* class SSN from the People's Republic of China, but the 1994 agreement with France is more important. The French agreement is to provide three *Agosta 90-B* class submarines equipped with air independent propulsion (AIP). These boats will replace the aging *Daphne* class while adding a significant technological upgrade. AIP would allow these submarines to remain submerged between battery charges nearly five times longer. It does not provide the extended speed capacity of a nuclear platform, but does enhance the overall flexibility for the submarine commander.

"It is clear that the advanced technology systems present in Pakistani submarines would enable the vessels to pose a far more complex threat to Indian naval merchant ships. The defense of Karachi would also be enhanced further. Such a state of affairs would be exacerbated by the natural erosion of India's own submarine fleet in the next few years."[48] With the loss of the Foxtrots and the need to split forces between the East and West coasts, the numbers for the subsurface battle tend to slide toward Pakistan, decreasing the ASW gap.

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[46] Govil, "Why the Navy?," 65.

[47] Rahul Roy Chaudhury, "Advanced Technology Submarines for Pakistan: Implications for the Indian Navy," *Strategic Analysis* (December 1994): 1094.

[48] Ibid., 1096.

b. China

As China's economy seems to be on the upswing, so too does their naval expansion. Since the 1970s, their emphasis has evolved from a "brown water" coastal defense to looking to the "blue water." By 1990, the PLAN had developed into the largest Asian navy in front of Japan and India. "The development of the PLAN appears to be planned in three phases spread over a period of thirty plus years."[49] The remainder of this decade may see China expanding its naval presence and its ability to respond to regional events. If the build-up continues, China would become capable of showing its flag all around the world eventually working towards assuming the "mantle of a major global sea power." Of particular concern to India is the development of seaborne logistics, the planned acquisition of an aircraft carrier and, most critically, the construction of facilities in the Indian Ocean. Although, PLAN visits to the Indian Ocean Region have been infrequent, assistance to Myanmar since 1991 and port calls to Karachi indicate that Chinese presence is on the rise. The current threat to India can be assumed to be minimal, as logistics are in the India's favor. "However, in the near future, possibly as early as the turn of the decade, the maritime dimension of the Chinese military threat to India will increase in intensity" and may develop into a rivalry over influence in the region. [50]

c. United States

Beginning with the deployment of *USS Enterprise* in the Bay of Bengal in 1971, India has recognized the message that the United States is "willing to intervene, in naval terms, in any development in any area that Washington considered inimical to its interests."[51] With the U.S. Navy based in Diego Garcia, and the continued presence of

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[49] Rahul Roy Chaudhury, "The Chinese Navy and Indian Security," *Indian Defence Review* 9, no. 1 (January 1994): 51.

[50] Ibid., 54.

[51] Subir Bhaumik, "Bay of Bengal - Emerging Naval Competition," *Indian Defence Review* 9, no. 2 (April 1994): 89.

deployed forces in the Western Pacific, Persian Gulf and Indian Ocean, the United States is capable of responding to any event in a rapid fashion. Up until the 1990s, India could feel somewhat secure with the presence of Soviet forces to counter U.S. presence. With no balance remaining, the residual superpower could seem quite threatening while India attempts to build its own regional influence.

d. Other Perceived Threats

Other possible concerns for India include Japan, Iran, Indonesia and Australia. Japan simply has a larger and more technologically advanced navy. Their significant interests in the trade route from the Middle East will likely force the decision to extend their clout on all sides of Asia to ensure they can protect their source of vital energy resources. Iran's rapid naval development indicates their resolve to have an influence in the region as well, and their construction of nine midget submarines adds an element of tension to the Persian Gulf. Any ties between Iran, Pakistan and China would definitely be of concern to India. Indonesia and Australia have also shown concern for their interests in the area and have used their navies to send the message. Cooperation between India and these forces has been demonstrated through joint exercises, but this does not preclude the outside chance of conflict.[52]

e. Analysis

Accepting the geostrategic argument and regional dominance as primary for India's overall naval strategy, the question of whether or not a submarine is the appropriate platform to center on must be discussed. The only significant capability the Pakistani Navy maintains is its sub-surface force. The chance that Pakistan may level the playing field with a limited number of submarines, and the increased likelihood of this scenario should the AIP platforms be acquired, provides sufficient argument for the current force structure of Indian submarines. Against the Chinese threat, the submarine is

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[52] The 'Other Perceived Threats' are a compilation from two primary articles. Govil, "Why the Navy?" cited earlier and K. Balaram, "India in 1990's-Defense Compulsions," *Indian Journal of Political Science* 51, no. 4 (October-December 1990).

best suited to choke point interdiction while avoiding the visible presence of a surface fleet. If China materializes as a true presence in the Indian Ocean with bases in Myanmar, then a surface fleet will play a much larger role. In both of the situations, the ability to launch an anti-ship cruise missile would shift the advantage to India.

Against the qualitative and quantitative superiority of the United States Navy, India could only hope for to deter U.S. forces by being able to get close and utilize surprise. Weapons range superiority would keep the Indian surface fleet at a distance rendering them ineffective. Submarines could attempt to slip inside the escort ring to inflict damage, but at the risk of losing an uneven exchange.

Each of these threat scenarios provides justification for submarine warfare, but when limited to the Indian Ocean, and short order battles, these missions can all be accomplished by conventional submarines. "Conventional submarines can be deployed on patrol independently and far away from [Indian] shores in all kinds of weather and off enemy ports. Looking at areas around [India] a fleet of 12-15 conventional submarines would be the minimum needed to fulfill these tasks."[53] Upgrades in weaponry and/or propulsion (adding AIP) would solidify this force at a much lower cost as compared to the nuclear option. A larger diesel fleet could provide greater flexibility over a minimum complement of nuclear vessels, but at the cost of mission response capability. Therefore, the national security argument has shaped the overall development of the conventional submarine fleet, but does not sufficiently justify the cost of nuclear propulsion.

2. Factional Interests

Since 1978 when the Navy's twenty year plan was developed, it needed an internal ability to present its needs to the Ministry of Defence. The nature of naval procurement and shipbuilding both require a long term view in planning to ensure funding for construction and the placement of orders to exporting countries. The time lag from design

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[53] S. P. Govil, "Indian Navy - Its Shape and Size," *Indian Defence Review* 9, no. 2 (April 1994): 20.

to delivery could be as long as ten years and the international procurement is rarely much better. Budgetary constraints have always been tight for the Indian Navy. The submarine community has been able to work within these barriers to acquire or produce platforms (for example, two indigenously built *Type 209s*) in times when the rest of the fleet did not receive a single new ship. This influence was able to have 3.5 percent of total military expenditures allocated for submarines when these boats comprised only fourteen percent of the Navy.[54]

For conventional submarines, naval interests would have been supported by Mazagon Docks Limited (MDL). India has been able to build a sizable military-industrial complex over the years with the primary segment being made of the Public Sector Undertakings (PSUs). This group employs over 300,000 people making them one of the largest employers in the nation. The top four PSUs, including MDL, account for 90 percent of total gross sales.[55] This significant contribution to the Indian economy provides these groups with substantial influence. MDL is the sole builder for the submarine program and has interest in maintaining a continuous building program in order to support the technical specialties associated with submarine construction. Upon completion of the *INS Shankul*, the second Indian built submarine, this group lobbied for additional hulls. Since this time, the HDW construction license was resurrected and two more subs are now under construction.

The nuclear propulsion program requires very different support because of its high cost and technical demands. The capabilities of a nuclear submarine coupled with cruise missiles was very appealing to the submarine community and resulted in the lease of the

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[54] Michael Don Ward, and A. K. Mahajan, "Defense Expenditures, Security Threats, and Government Deficits," *Journal of Conflict Resolution* 28, no. 3 (September 1984): 50. This data was taken from the Michael Ward article and the *World Military Expenditures and Arms Transfers Journal* and cited in the study by R. E. Clark II, "The building of a Powerful Indian Submarine Force through Multinational Arms Transfers and Foreign Systems Exploitation," for a seminar, NS 4250 at the Naval Postgraduate School in Monterey, 1990.

[55] Michael D. Ward, "Military Spending in India," *Defence Economics* 3 (1991): 44.

Soviet *Charlie-I* (renamed *INS Chakra*). According to Ashley J. Tellis, the naval leadership was interested in purchase of additional Soviet SSGNs of multiple classes, but this avenue has since closed. [56] The project to develop an Indian designed nuclear powered submarine called the "Advanced Technology Vessel" (ATV) has received support at the highest levels of the navy, Defence Research and Development Organization (DRDO) and the Department of Atomic Energy (DAE). The key challenge and the most costly segment of the design is the nuclear reactor.[57] The ordeal of one Navy Captain proves the existence of factional infighting over the control of the ATV reactor design.

According to an article in *Hindu International*, CAPT Budhi Kota Subbarao has run into resistance from the Bhabha Atomic Research Center (BARC) because of his involvement as the navy's point man for reactor design. His work alongside BARC began in 1976 when the nuclear establishment initiated research and design for a naval reactor.[58] This undertaking began prior to the ATV project and in concert with the navy. CAPT Subbarao analyzed three designs from BARC engineers and concluded that they were not viable submarine reactors. Under Navy direction, the captain completed two years work on his own design, but this was unsatisfactory to BARC as it was design outside of their center. Subsequently, Subbarao was removed from the project. Shortly thereafter, the captain, now retired, was jailed for a total of twenty months while his case was argued in the courts. The unclassified thesis, based on the submarine, which he was carrying was used as a premise for prosecution under the Official Secrets Act. This level of infighting

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[56] Ashley J. Tellis, "Securing the Barrack: The Logic, Structure and Objectives of India's Naval Expansion," *Naval War College Review* 43 (1990): 35.

[57] Joshi, "Desperately Copying Charlie, India Designs Nuclear Submarine," *Times of India* (14 December 1994) 4.

[58] "Ordeal of a Navy Captain," 4.

over a project of this size indicates significant control by the primary organization involved.

Factional interests have shaped the development of the submarine fleet since the expansion began with the German contract. The conventional factions contained within the Navy and shipbuilding industry are primarily concerned with continued building in order to prevent deterioration of this segment of the fleet. BARC's influence is aimed at control of the reactor design in order to ensure rupees continue flowing into their accounts even at the cost of delaying the project, which then raises cost (or revenue depending on your point of view).

3. Technological momentum

This argument follows many of the same lines as factional interest. The difference is in how the decision to develop or continue a program is arrived at. Technological momentum suggests that since the capability exists, the program becomes a natural decision without the necessary force from below. For diesel submarines, this would mean that the Indian naval leadership funds construction solely because the capacity is available. In the case of nuclear development, the national leadership would view this design as the natural extension to follow the construction of diesels. There is no evidence of this thinking for the construction process. In the area of operations, CDR C. Uday Bhaskar states that: "Having a certain level of expertise in submarine operation and maintenance, it was only logical that the IN [Indian Navy] kept abreast with technological breakthroughs and a nuclear-propelled submarine - a true submersible - was a natural corollary."[59] Lacking a current corollary to the procurement of air independent propulsion (AIP), this argument has little backing.

One unsubstantiated prospect for this argument is that the nuclear weapons program was approaching an endpoint in the 1970s. This would cause the nuclear establishment to look for new areas to explore. The professed peaceful intention of the

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[59] Bhaskar, "The Indian Navy," 38.

Indian nuclear program limited the possibilities, forcing this large corps of engineers towards the idea of naval applications. The only evidence remotely linked to this idea is the start date for the BARC project prior to beginning the ATV project.

Technological momentum's influence on the shaping of the submarine fleet is tied closely to the scientific bureaucracy. This is produced by a faction pushing for the continuation of their work as they reach milestones and look for direction for their efforts. Technological progress requires funding for research, which in this case would only come through the Ministry of Defence, thus tying the momentum to the group which has the influence that much closer.

4. Institutional Theory - Status, Norms and Identity

The rhetoric which brings out the indications of a social value being placed on submarines begins at the level of the naval force structure and on the value of the strength demonstrated by the submarine. "The one factor that has remained constant is the equation between major power status and sea-power. European history is replete with examples and more recently America, Russia, Japan and China have reiterated this tenet."[60] The positive side-effects of a plan for naval expansion include the increased international attention received as a nation. "The acquisition of a second carrier and lease of a nuclear submarine are the catalysts that have caused the ripples. From Washington to Canberra, the [Indian Navy] is being projected as a service that is rapidly acquiring a 'blue water' capability, whose ultimate aim, it is alleged, is to dominate the Indian Ocean."[61]

Attention of this type is of great value to a nation which has remained non-aligned and perceives itself as a Third World superpower. One instrument which India has utilized to perpetuate international attention has been the submarine, as is proven by the priority placed on the ATV program over construction of an aircraft carrier. Even before the

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[60] Ibid., 39.

[61] Ibid., 35

nuclear propulsion program gets running, the combination of proven submarine building at MDL and the perception of progress by ATV designers raises the position of India in the global structure. No nation still considered a part of the "less developed" group has even a conventional submarine construction program, and only five navies operate nuclear propelled submarines. "The emergence of the nuclear submarine as the new platform of deterrence and the fact that all major powers (United States, China, France and the United Kingdom) are investing in this capability is a reality that cannot be ignored."[62]

This evidence, coupled with the lack of sufficient threat to justify the high cost alternative of a nuclear platform, indicates a high probability that the status or global value associated with a nuclear submarine has shaped the continuation of the ATV project during a period of budget constraints and very long delays prior to construction. "India evidently wishes to increase its status in the international defense community, and this has had a large impact on military budgeting and policy in spite of some significant economic constraints."[63] For the conventional platform, the existence of alternative explanations limits the affect which social value can have on this program, but does not eliminate the existence of that value.

D. CONCLUSION

Motivations for the development of nuclear or diesel submarines are vastly different. The conventional submarine is a cost-effective, potent weapons platform. Current threats to India indicate the usefulness of a sub-surface element in naval strategy creating the heaviest impact upon shaping the conventional fleet. Security interests have been threatened throughout the development of a submarine fleet, thus providing a motivating influence for initial acquisitions and modernization. Factional Interests in the navy and at MDL support a continued shipbuilding program, but their interests are in step

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[62] C. Uday Bhaskar, "Chinese Maritime Resurgence & India," *Times of India* (20 December 1994).

[63] Ward, "Military Spending in India," 46.

with the national interest such that their impact does not have a negative effect on the overall goal of defense. Factional influences were secondary in shaping a conventional fleet. The force of prestige on the decision process is present only because submarines are a valuable part of any modern navy, but this trend is driven by the military value of this platform more than by the social value. All of these influences helped to shape the conventional submarine fleet as was expected, but the dominant fact to be considered is the threat-based justification.

On the other hand, the security threat is not far reaching enough to warrant the additional cost of a nuclear platform and the associated support facilities. All mission scenarios developed by the Indian Navy are suitable to diesel-electric submarines. Performance would be enhanced by technical upgrades in weapons and conventional propulsion systems, with the only losses as compared to the nuclear sub being top speed and endurance. Security interests appear to little influence on nuclear submarine development.

Factional interests have been intimately involved in the motivation behind the naval nuclear propulsion program from the beginning. A group such as BARC or DAE had to be heavily involved to gain and maintain support for a high-cost project of this type. The nuclear establishment began research and development on reactor designs prior to government support for the ATV program. This group was motivated through self-serving interests as well as their own scientific momentum. The remaining piece of this puzzle is the international value added to the Indian Navy by this program. If India is to be considered a rational actor, the cost of the program needs to be offset. To complete the ATV program would lift India's global clout into the same class as the five nations operating SSNs. Therefore after the program began, the social value and impact on Indian national identity begin to drive support for nuclear submarine development balancing the costs and benefits.

Looking at the long term threat, economic factors and force capabilities, India will likely direct resources into different sectors in the future. Although, the nuclear program

will not be scrapped, it will maintain only slow progress into the twenty-first century. Conventional submarine modernization will also be slow until the whole fleet is better balanced. Although there are no current contracts reported, air independent propulsion is coming over the horizon and could be refitted onto all platforms.

III. PEOPLE'S REPUBLIC OF CHINA

The economic boom reported in mainland China has drawn attention to the military force structure and spending of the People's Republic of China (PRC). The declaration of a strategic shift from coastal defense to maritime protection has focused much of this interests on the naval component, the People's Liberation Army-Navy (PLAN).[64] Accompanying this shift is a desire to create the 'blue water' navy required to cover China's expanded range of interests. "There can be little doubt that Chinese maritime strategy, prompted by increasing offshore economic interests and by the dependence of future Chinese economic growth on international trade, now looks outwards and not simply to the security of its seaward borders."[65]

With China under communist control, the warfighting ideology centered on Mao's "People's War" where the man meant more than the weapon. A navy is difficult to fit into this philosophy and remained the third priority behind the army and air force. Shortly after 1950, when PRC leadership began developing the PLAN, force structure was dominated by submarines and small surface vessels of limited capability.[66] The 1950s witnessed China developing the infrastructure necessary to build conventional submarines, and the start of the Chinese nuclear submarine program. By 1970, the submarine was the dominant platform of the PLAN as seen in Figure 1. The Chinese submarine program peaked in the

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[64] Chong-Pin Lin, "Stepping Out - China's Lengthening Shadow," *International Defense Review* (February 1995): 31.

[65] John Jordan, "The People's Liberation Army Navy (PLAN)," *Jane's Intelligence Review* (June 1994): 282.

[66] David Miller, "The Maritime Importance of the South China Sea," *Naval Forces* 14, no. 2 (1993): 33.

1980s with over one hundred platforms including nuclear attack and ballistic missile submarines.

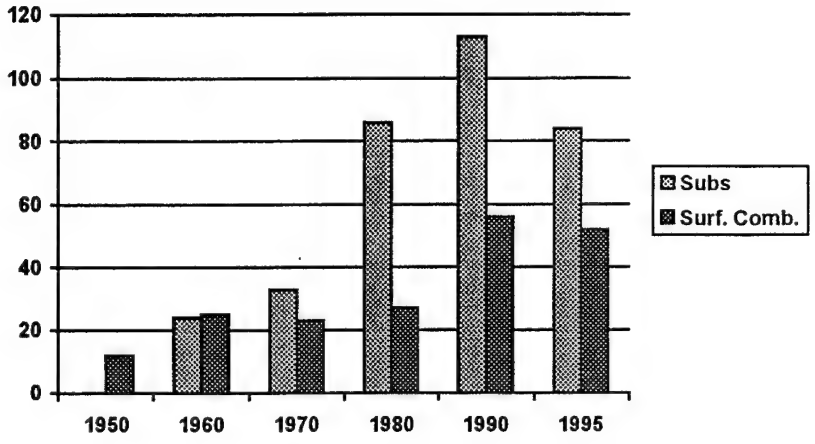

Figure 1: PLAN Force Structure[67]

As can be seen in Figure 2, when compared to other major navies the PLAN force structure was disproportionately weighted towards submarines from the beginning. In addition, other ASW capabilities were neglected. No other major navy has approached a ratio of one to one for submarines and surface combatants.[68] China has exceeded this ratio since 1970 and even exceeded three to one in 1980. This comparative over-emphasis is the key to studying Chinese submarine development.

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[67] Data drawn from Jane's Fighting Ships for 1950-51, 1960-61, 1970-71, 1980-81, 1990-91, 1995-96.

[68] The North Korean Navy has twenty-six submarines and only eight surface comabatants. This force structure is likely modeled after the PLAN due to Chinese assistance including submarine construction.

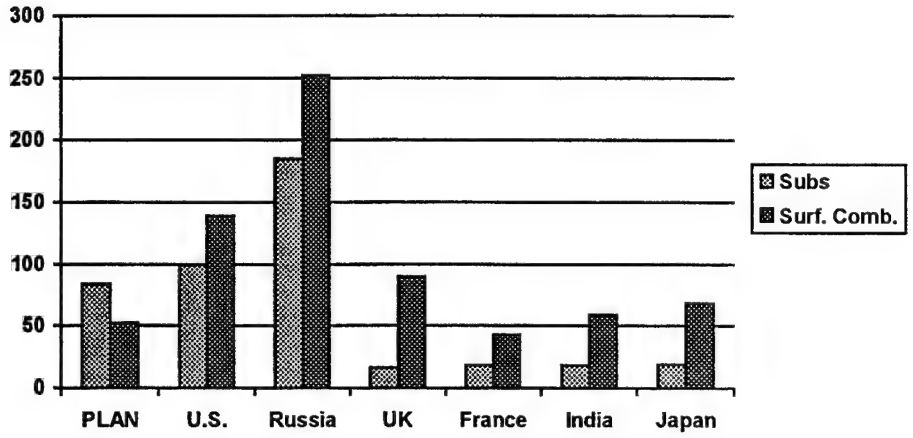

Figure 2: Naval Force Structures - 1995[69]

The hypotheses of Chapter I are used to break down the motivations for both the nuclear and conventional programs. Project 09, the nuclear submarine design program, was conceptualized as the superpowers had just begun to deploy nuclear propulsion. The PRC visualized its own potential to compete with the Soviets and Americans. A nuclear submarine symbolized this status as described by institutional theory. Project 09 was begun by the central government and slowly gained a life of its own. Over time, the 'value' of the program outgrew the capabilities which it would bring due to the relative gap widening with the major navies of the world.

Chinese conventional platforms had a similar, but limited symbolic value. The submarine was emphasized and built in China not as a means to counter a direct threat, but to create a threat for China's neighbors via conventional deterrence. Once the capability to build submarines was established, this program was put virtually into auto-pilot for years. As the *Romeo* became outdated and building continued, it is likely that the PLAN did not

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[69] Richard Sharpe, ed., *Jane's Fighting Ships 1995-96* (London: Jane's Defense Publishing, 1995): 114, 208, 544, 756, 790.

intend to utilize these platforms in an anti-submarine warfare (ASW) role. Lacking the complementing surface ASW forces, the Chinese submarine fleet is difficult to justify on an ASW basis. The most likely use for the numerous conventional platforms would have been to surround and cripple Taiwan's trade links to the outside world, or to act as a layer of defense in a war of attrition as described by a "People's War." Only in the nineties has the PLAN building program begun to reflect a more balanced nature as demonstrated by new surface combatant designs, the negotiations over a small carrier and the rhetoric about a 'blue water' navy. With that, submarines are no longer such a dominant portion of naval force structure.

The early development of China's submarines is of primary interest for this study in order to draw comparisons to newly developing navies. The age of the information on PLAN development, added to the restricted accessibility of early Chinese documents, makes the reconstruction of the data very difficult. The historical account of John Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age*, is the best source on events during submarine development.[70] This study relies heavily on the account of Lewis and Xue, but utilizes their work to look at submarine development from a new angle.

A. DESCRIPTION OF PLAN SUBMARINE DEVELOPMENT

Ever since the completion of the Great Wall, the major external threat to China came from the sea.[71] Naval tradition within China has deep, but thin roots. The fifteenth century voyages of Cheng Ho were monumental for the period, but quickly ended with the loss of Imperial support. The Chinese Navy temporarily resurfaced in the 1880's with a relatively modern fleet, which provided stout resistance in a losing effort during the Sino-

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[70] John W. Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age* (Stanford: Stanford University Press, 1994).

[71] Jordan, "The People's Liberation Army Navy (PLAN)," 275.

Japanese War. Through the turmoil to follow, the Chinese Navy became effectively non-existent by the First World War.[72] The navy was ignored until the after the Second World War. China was able to supplement the navy with surrendered Japanese vessels.

Under the People's Republic of China, naval developments were greatly affected by the political impetus currently underway. The outstanding factor in this development has been the continued emphasis upon submarines. It has not been until recent years that doctrine has begun to push a balanced fleet concept. Submarines have been disproportionate in the People's Liberation Army Navy (PLAN) force structure from the beginning as compared to the other navies in the Pacific.

Prior to the Sino-Soviet split, submarine technology was a large part of the military cooperation of the communist allies. China quickly recognized the emphasis being placed on submarines by the United States and Soviet Union and turned in this direction. Early transfers from the Soviets included the *Whiskey* class diesel-electric submarine as well as a number of smaller submarines. By 1960, Chinese shipyards had successfully constructed a *Whiskey* class SSK from pre-assembled pieces and had moved to independent construction. The submarine fleet consisted of twelve *Whiskey*s with nine additional units under construction.[73]

The Sino-Soviet split ended cooperation, but the sales contracts continued on a minimal basis. The early sixties saw the transfer of four *Romeo* class conventional submarines and one *Golf* class ballistic missile submarine (SSB). These platforms represented a step change in capability for the Chinese. The *Romeo* was a proven platform which the Soviet navy also used to replace its *Whiskey*s, and the *Golf* allowed reverse engineering of the ballistic missile launch systems for Project 09-2. Chinese naval force structure was dominated by the submarine. Surface ship designs emphasized escorts with extremely limited ASW assets. The rationale behind this mixture was based upon Taiwan

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[72] Miller, "The Maritime Importance of the South China Sea," 33.

[73] *Jane's Fighting Ships 1960-61* (London: Jane's Fighting Ships Publishing, 1960): 117-21.

as the primary threat. The submarine fleet was intended as a blockading force with little concern for other submarines.

The Chinese leadership was not satisfied with operating only conventional submarines. Sino-Soviet negotiations over the transfer of nuclear technology remained unresolved. The Soviets offered the establishment of a joint Sino-Soviet submarine flotilla based from the Chinese coastline, but this did not satisfy the Chinese desire for a modern submarine fleet. Project 09, the Chinese nuclear submarine design project, began in 1958 to develop an indigenous nuclear submarine. The main characteristic of Project 09 was that it undertook all aspects of design simultaneously, from the propulsion plant to hull and weapons designs. The intent was to develop a nuclear powered submarine and immediately revise that platform for a ballistic missile submarine. [74] This had not been accomplished by either the United States or Soviet Union.

The Cultural Revolution and the death of Lin Biao were large setbacks to the research and design programs of the PLAN. In contrast to other military programs, Project 09 sat on the side with reduced manpower, but slowly continued its progress. Through all of the political and economic turmoil, submarines kept being produced, if only at a low rate. The remainder of the navy did not recover until the mid-1980's.[75]

After the delays caused by politics and design flaws, the PLAN conducted the initial sea trials for the first *Han* class nuclear powered submarine in 1974. The second unit was completed in 1977 and has been followed by three others. At an extreme cost, China fulfilled a twenty year desire to join another form of the "nuclear club."[76] The ballistic missile submarine program, Project 09-2, emerged separate from the original project in 1967. Considering the amount of duplication between designs, the final addition of the *Xia*

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[74] Lewis and Xue, *China's Strategic Seapower*, 23.

[75] Antony Preston, "The Changing Face of the PLA Navy," *Asian Defence Journal* (August 1989): 75.

[76] The United States, Soviet Union, Britain and France are the only other navies operating SSNs/SSBNs even today.

class SSBN to the fleet in 1983 seems quite slow. The follow-on submarines of this class were delayed and suspended as Deng Xiaoping shifted budgetary emphasis from the military to commercial modernization.[77] It has been reported that the second *Xia* SSBN was launched in 1982, but unconfirmed reports show the loss of one in 1985.[78] Project 09-3, the follow-on SSBN design, is in development.

The conventional submarine program was not setback as significantly as the more expensive nuclear program through the political turmoil. Chinese shipyards pumped out *Romeo* class submarines at a rate of six platforms per year. The inventory topped out at over 100 submarines in the late eighties. The problem with this program was that the design was rarely updated, making the fleet ineffective in the late cold war undersea environment. However, if U.S. and Soviet submarines are neglected, the sheer numerical superiority of the Chinese submarines made them a formidable threat to anyone within their limited range. In the eighties, even half of the *Romeo*s might have been effective in blockading Taiwan prior to possible U.S. intervention. In an attempt to upgrade the conventional submarine fleet, Chinese designers built the *Ming* class submarine. Early problems kept production low, but as these obstacles fell to the wayside, a limited number of *Ming*s became available to support the *Han* in the longer range missions. The PRC returned to its old supplier in 1995 for a purchase of four *Kilo* class submarines. The most important implication of a Kilo purchase is the transfer of advanced technology, ranging from anachoic coating and sound silencing techniques to possible fuel cell AIP.[79]

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[77] Lewis and Xue, *China's Strategic Seapower*, 121.

[78] Although all current sources do not agree, some articles have stated that the second *Xia* is operational. *Jane's Fighting Ships 1995-96* indicates that only a single SSBN is operational concurring with Anthony Preston "Asia-Pacific Navies to the End of the Decade," *Asian Defense Journal* (January 1993) 62, while later *Asian Defense Journal* reported a fleet strength of three SSBNs in 1987 ("Naval Build-up to Continue Unabated," *ADJ,* March 1992, p. 51) and Stewart Walters reports four *Xia* ("Asia Aims Its Sights Underwater," *ADJ,* June 1994).

[79] Sharpe, *Jane's Fighting Ships 1995-96*, 117.

Even with the continued emphasis on submarines, the PLAN lacks any capability of carrying out an ASW mission. The *Romeo* submarine's sensor systems are short range active systems lacking the data processing needed to gain passive acoustic detection. The *Han* SSNs are too noisy to be effective ASW platforms without additional assistance. The *Ming* class SSK might be an adequate ASW platform, but they are limited in numbers. The *Luda* class destroyers, the most common platform in the surface fleet, have negligible ASW capabilities and are easy targets for modern submarines. Only the newest Chinese destroyers, the *Zhangjiang*, are suited to this mission. The PLAN recognizes the deficiencies in its force structure and has begun working to correct this problem. "The development of the PLAN appears to be planned in three phases spread over a period of thirty plus years."[80] The 1987 declaration of a desire to develop "blue water" capabilities stems from China's perceived role for itself in Asia and recognition of expanding maritime interests. Naval expansion is aimed at adding the balance needed in the force structure, including ASW platforms, but the growth of the PLAN is dependent on the economic growth in the PRC.

B. TESTING THE HYPOTHESES

1. National Security - Threat Based

The PLAN was the smallest segment of the PLA and overshadowed by the ideology of Mao and the "People's War." With the recognition of the impact of high technology weapons systems, the navy and submarines are gaining greater influence. The Chinese coastline extends 14,500 kilometers from the Korean Peninsula to Vietnam. The twelve major ports are active with 165 billion dollars of imports and exports. The addition of Hong Kong in 1997 will boost this number significantly. The Exclusive Economic Zone

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[80] Rahul Roy Chaudhury, "The Chinese Navy and Indian Security," *Indian Defence Review* 9, no. 1 (January 1994): 51.

(EEZ) of China covers three million square kilometers and encompasses disputes with Asian neighbors from Japan to Indonesia. The maritime territories of China, particularly the South China Sea, cover major trade routes for much of the world.

During the cold war, Soviets and Americans frequently operated all around Asia. Today, the U.S. Navy is the primary naval presence, but with the lack of a cold war, many smaller navies appear willing to stand up for their own interests within the region. The dispute surrounding the Spratly Islands is a primary example. Although China is not directly threatened from the sea, tension with the United States and other nations are driving the PRC to reconsider its maritime position.

Chinese sources indicating perception of threat are vague at best. I draw upon other sources and non-naval events to postulate the threats. The lack of published threat perceptions is not an indication of Chinese contentment with the world, but more likely an indication of this topic not being available to open sources. The perceived naval threats to the PRC range from the United States, due to shear capability differences, to the small navies attempting to protect their own interests in the South China Sea. These perceived threats include any navies considered to impact upon Chinese interests, particularly those interests within territorial waters. The PLAN build-up is focused on creating parity with India and Japan for the short term and with becoming a world power in the next thirty years.

a. United States and Russia

The United States Navy is perceived as a threat to the PLAN solely due to its ability and history for exerting its influence in the region. This situation is not expected to change unless U.S. interests change in the region. Lacking any formidable ASW defenses, U.S. submarines would have the freedom to operate at will in Chinese waters. Stephen Ryan quotes one naval analyst that "one U.S. attack submarine would deter any Chinese military venture."[81] This is a broad statement but when concerned solely with

naval ventures, a U.S. submarine would hold a significant capability advantage against PLAN forces.

Russian capabilities, though currently backed by rapidly declining budgets, present a similar picture to the Chinese without the ocean in between. The vast borders of these nations provide for many disputes. Except for the Korean Peninsula, there would be nothing separating the maritime territories. The historical relationship of the PRC and USSR has been tense since 1960. When Sino-American relations improved, the Chinese were even willing to ask for U.S. guarantees against Soviet nuclear aggression.

The tensions between all three nations are slowly releasing. However, even though the United States and Russia have agreed to end the targeting of the other's cities by nuclear weapons, this same assurance has not been extended to the mainland of China. In conjunction with the difference in the number of warheads available to the United States or Russia, the PRC remains in a position justifying the continued push for a survivable strategic platform.

b. Japan and India

Japan and India have the navies most comparable to the PLAN. "While Beijing does not yet feel threatened, it is nevertheless worried by the trends."[82] In the case of Japan, the PRC sees a historical adversary which has a significant technological advantage and an economy capable of backing it up. The Japanese Maritime Self Defense Force (JMSDF) has more destroyers and frigates than either China or India. The strategic posture of the JMSDF has been extended out to one thousand nautical miles, well beyond the territorial area of an EEZ. A primary indicator of the Chinese perception of a threat from the North is the concentration of PLAN forces in the Northern fleet, including

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[81] Stephen L. Ryan, "The PLA Navy's Search for a Blue Water Capability," *Asian Defence Journal* (May 1994): 31.

[82] Tai Ming Cheung, "China's Regional Military Posture," *International Defense Review* 24, no. 6 (June 1991): 622.

China's nuclear attack submarines, while the most recent confrontations with other navies have been in the South China Sea.

As described in Chapter II, the Indian Navy is openly building its own naval force structure in an effort to develop blue water capabilities including new aircraft carriers and other power projection platforms. India is also stating the desire to prevent the reach of the PLAN into the Indian Ocean region and has attempted to assert its own influence in Southeast Asia. The financial aid provided to Burma by the Chinese for naval facilities in the Bay of Bengal indicates a future desire to operate in this area. China has also begun deployments to this area to foster naval contacts and test new logistics assets.[83]

c. Southeast Asia

The South China Sea is the primary area of new concern for the PLAN. With a new emphasis on maritime vice coastal defense, the PLAN faces many small navies also attempting to protect their own perceived interests in the area. Vietnam and China engaged in naval conflicts over the Paracel Islands in 1974 and again over the Spratly chain in 1988 when three Vietnamese vessels were sunk. The Philippines, Taiwan, Malaysia and Indonesia also claim sovereignty over various islands of these chains. If not for the expectations of great resource wealth, this area would likely be just an arena for flexing muscle.[84]

d. Taiwan and Korea

Taiwan is considered a threat by the PRC in both military terms and in political terms. As a policy position, Beijing has lobbied against military acquisitions by Taiwan and has been successful in blocking the purchase of additional submarines from the Dutch. Politically, the PRC leadership has forced themselves to plan for an improbable military action against Taiwan in the case of a claim of independence. The PRC considers

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[83] Chong-Pin Lin, "Stepping Out - China's Lengthening Shadow," 32-3.

[84] Miller, "The Maritime Importance of The South China Sea," 33, and Jordan, "The People's Liberation Army Navy," 282.

the issues surrounding Taiwan to be internal domestic issues, but they have impacted the shaping of PLAN forces and operations.

North Korea was provided assistance by the Chinese in order to establish submarine building capacity. The North Korean fleet could be characterized as a smaller version of the PLAN with thirty-five Romeo class submarines plus a small surface fleet. One unique addition is the midget submarines operated by North Korea. South Korea is beginning to expand its own fleet with the indigenous construction of submarines. As this fleet grows it will cause similar concerns to the PLAN as the JMSDF does today.

The PLAN remains a threat only to its neighbors. Current strategies have expanded to accompany the increase in capabilities, but nonetheless this force would be incapable of standing up to even the JMSDF. India might be a fair fight, depending on the location and logistical support. The PLAN would still need to depend on numerical superiority in order to exert its force against the smaller navies which it must share the waters with in the southern territories.

e. Analysis

Assuming that China's desire is to hold a position of regional importance, but not in a hegemonic role. China has not been threatened from the sea since the Japanese invasions of the "Undeclared War" of 1937-39. China's limited naval conflicts of this half of the century have been with the minor navies of the region such as Vietnam.

The submarine threat to China has been limited for years. U.S. and Soviet submarine operations focused on cold war missions. Japan's submarines were limited by constitutional interpretations and the U.S.-Japan security agreement, but it cannot be assumed that China considered this to eliminate any possible threat. India's submarines were unable to reach into Chinese waters and the other regional submarines lacked the capability to impact Chinese interests. However, this is all changing.

Under the above circumstances, a threat based argument is difficult to justify without assuming China to perceive capability as threat. A coastal defense mission, and even a blockade of Taiwan, could have been accomplished equally as well by other

types of platforms. As ASW platforms, the *Romeo* and *Han* classes needed additional emphasis on sensor packages. The apparent lack of ASW doctrine leads to the conclusion that the conventional submarines were intended for an offensive purpose. This possibility is consistent with the advantage provided by the operating areas along the Chinese coast if the PLAN evaluated this factor. The national security hypothesis is difficult to validate in the past. Early submarine development appears to be shaped in order to create a threat, possibly in terms of a conventional deterrent.

In the past decade, the undersea emphasis has shifted, to a more defensive nature. The newest Chinese surface vessels are a step improvement in ASW capability. The submarine program has begun to look beyond the early sonars provided by the Soviets, including the installation of the French DUUX-5 in the newer submarines. The purchase of the *Kilo*s from Russia also supports a desire to increase the reach of China's submarines while gaining more effective ASW hulls. Overall, the Chinese conventional submarine fleet is better justified today on a threat basis than in the past.

The question of the motivation for the nuclear submarines goes directly to the professed missions of the PLAN. The coastal defense posture and now the maritime territorial stance do not require the extended range or endurance of a nuclear platform. Even within the two hundred nautical mile boundary of the EEZ, a conventional submarine is sufficient to provide for effective patrolling. Thus, the development of nuclear power requires additional motivations beyond this hypothesis.

2. Factional Interests

The organizational structure within the PRC's government is formulated on the basis of creating a general reporting chain going from the peak of the central government down to specialized areas of expertise. The nuclear submarine design project, Project 09, was integrated heavily into this structure. Project 09 operated under the First Ministry for Machine Building which reported to the Defense Science and Technology Commission. The only level above this was the Central Military Commission (CMC). The key figure in

the top two levels was Nie Rongzhen, a leader in weapons research and design. Nie's primary goal was the development of a nuclear powered missile submarine. His primary model for organizational structure was the U.S. Navy's Special Projects Office, which handled the Polaris program.[85]

Some of the early difficulties experienced were the result of Project 09 being an isolated organization rather than becoming integrated into the national infrastructure. During the 1950s, Soviet industrial assistance was considered dependable. Chinese emphasis was placed on production facilities which utilized Soviet heavy machinery. China's major industries were unable to support the special needs of Project 09.[86] The Sino-Soviet split caused setbacks in the nuclear programs due to the need to develop the industrial support network, and created economic difficulties for all China.

During early program development, factional battles for control frequently altered the direction of submarine development. The National Defense Industrial Commission placed its priority on the modernization of conventional forces over the strategic forces, but Nie Rongzhen was able to rally the support of Mao Zedong and Lin Biao for the continuation of Project 09. One year later in November 1962, the top leadership of the PRC reversed course and scaled back funding to the nuclear submarine program to a level where only a small core of experts could continue. The remaining efforts were focused on the reactor design. When Project 09 was later restored to scale, the organization was controlled within the regular channels of the military industrial system. This new core would be the reason the program survived the coming political turmoil.

The Great Leap Forward and the Cultural Revolution had different impacts on Project 09. The isolation of this program saved it from the mass movements of the Great Leap, but not the Cultural Revolution which reduced it to a point where "gains were minimal and fragmentary." Following his death in 1976, Lin Biao's ties to the Defense

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[85] Lewis and Xue, *China's Strategic Seapower*, 4-9.

[86] Ibid., 27.

Science and Technology Commission caused great scrutiny and further delays for the program.[87]

For the nuclear submarine program, factional interests were different than those seen in India. Factionalism was in the form of competing leaders vice an organization pushing a program. Control of Project 09 shifted between the National Defense Industry Organization, Defense Science and Technology Commission and the Project Leading Group, based on who was in favor with party leadership. Power politics played a large role in the delays for Project 09. The bottom line decisions clearly remained at the peak of the government while the organization which advised and carried out these orders shifted frequently. In the end, the successful completion of the nuclear submarine program can be attributed to the close personal attention of Zhou Enlai to ensure the program held support through the many troubles encountered during the lengthy sea trials. Zhou recognized the need to remove politics from the development program.[88] Factional interests were limited in the drive to completion for Project 09.

The conventional submarine program was much less impacted by political turmoil. In the spring of 1960, with the Sino-Soviet split developing, the CMC placed an emphasis on the building the *Romeo* and *Golf* submarines. The designs and equipment for these programs were provided in the Soviet's final attempt to slow or close the rift. China was then able to funnel heavy resources into the three primary shipyards in a move for self-reliance. Once the submarine building capacity was established, it was left alone to operate to it budgetary capacity. There was limited interaction with the nuclear projects except to develop the submarine launched missile. There is limited indication of an organizational lobby to promote conventional submarines, yet they continued to roll off the assembly line.

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[87] Preston, "The Changing Face of the PLA Navy," 75.

[88] Lewis and Xue, *China's Strategic Seapower*, 64.

3. Technological Momentum

The technological momentum hypothesis is not born out by the Chinese case study. Submarine development began from scratch with Soviet assistance while the PLAN was in its infancy. Lacking a tradition or the technological base for submarine construction, China embarked upon projects to level itself with the major navies of the world. The style of the development also goes against this hypothesis. Rather than taking the first step to developing submarines and allowing the program to grow from a base, China made a 'great leap' and attempted to go straight to the final product. It is impossible to accurately evaluate whether this method resulted in an overall reduction or delay in design time, but it does make the momentum explanation improbable.

The only possible application for technological momentum is in the construction of over one hundred *Romeo* class conventional submarines. Once the process began, the only restriction was budgetary. Production rates sometimes topped six hulls per year. The improvement of this class was limited. The momentum which carried this program was bureaucratic in nature rather than technological. The program did not require a factional type of influence. Momentum could be maintained by staying with the status quo The *Ming* class submarine was designed to succeed the *Romeo*. Design flaws caused the conventional submarine program to fall back on the less capable but proven platform until improvements could be made.

4. Institutional Theory - Status, Norms and Identity

Mao Zedong outwardly stated his goal in the early development of the PRC to be to "catch up with Great Britain" and then to go beyond this. Mao had grandiose visions for China's place in the world. While his ideology called for a "People's War," he also called for the development of "what others have" and the creation of a "small but all inclusive arsenal." In the years preceding the Sino-Soviet split, China lobbied heavily for

design assistance for a nuclear submarine. When the last hopes for this desire faded, Mao stated, "We will have to build nuclear submarines even if it takes us 10,000 years!"[89]

These attitudes lay the foundation for an institutional argument. The added proof for the symbolic nature of a submarine comes from the lack of surrounding infrastructure. When the nuclear submarine program was authorized in August 1958, the defining documents lacked a purpose or sense of mission for the prospective design. The general thrust was to lay out the technical requirements with limited justification. As the project developed, it lacked the strategic doctrine to support and shape the design or provide a coherent direction. This allowed the political influence to dominate program control.

"In the 1950s and 1960s, revolutionary idealism and patriotism brought the nation's best minds to the strategic weapons programs, and Project 09 was a beneficiary. After the mid-1980s, personal gain and opportunism began to replace idealism and patriotism."[90] The current leadership views economic success to be necessary before the military.

Another indicator of the submarines place in the Chinese priorities was its dominance of naval force structure with no complementing forces. The mission of the PLAN remained coastal in nature with the submarine as the only platform capable of going beyond a coastal reach. Until recent years, the overt desire to go beyond coastal defense was non-existent or suppressed, and the development of other ships to raise the capabilities of the PLAN was limited.

The nuclear submarine, particularly the SSBN, provided a symbol of modernity to the PLAN and China. The launching of these platforms provided a great deal of international interest. Now that the capacity has been proven, Chinese leaders have begun to emphasize other avenues. The 1991 Gulf War proved the impact of high technology

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[89] Ibid., 18.

[90] Ibid., 102.

weapons and China has now placed top priority on these projects for force modernization. The follow-on nuclear submarine projects have been lowered in priority even though the platforms currently in operation still have many problems.

The institutional value of the nuclear submarine faded as the capacity to complete the project became reality. The PLAN has refocused on the need for a credible ocean-going force, but this will take time to develop. A three stage development program will overhaul the military and step it through the level of a semi-developed nation prior to reaching the PRC's goal to be a leading world power in military respects. The submarine program is already well down this path with the rest of the PLAN decades behind. The reduction of priority for Project 09 does not indicate a Chinese rejection of the international norms associated with submarines, but rather a recognition of how the nuclear submarine's "value" can be further enhanced by being a component of a balanced fleet. A "blue water" navy has become a new avenue to achieving the international identity which it previously pursued through nuclear submarines. Much like the nuclear submarine was a "must" for the PRC, the expanding PLAN may fill this role today. Individual high-tech platforms cannot provide the same level of "value" within the global structure without fitting into a comp[rehensive package, in this case a "blue water" navy.

C. CONCLUSION

The motivations behind submarine development in China are varied between nuclear and conventional platforms. The conventional submarine program is best explained through the national security hypothesis, but for different reasons than seen in the Indian case study. China lacked any significant ASW threat other than the superpowers and these forces were generally occupied tracking each other. However, assuming that China perceived a threat from U.S. and Soviet submarines, the lack of conventional design upgrade programs limits the use of this explanation. Looking at the issue from a different angle, building the large fleet of *Romeo* class submarines was a means through which to

create an ASW threat for China's neighbors. This fleet could then provide for national security in other than a purely defensive role.

Other hypotheses carry less weight for conventional developments. Factional interests do not appear to be evident in building conventional submarines. Bureaucratic momentum is plausible when considering the continuity of the building but not for the initial momentum. The conventional submarines were overshadowed by the nuclear submarine program limiting their 'value' to the state.

Project 09 began early in the development of the PLAN. The United States and Soviet Union were deploying nuclear submarines. China required a program to attempt to counter this emerging threat. This could be a very simple argument, but China pursued only one option, nuclear submarines. Without the accompanying doctrine beyond coastal defense or the complementing forces to carry out ASW, the undersea threat falls short of justifying Chinese nuclear submarine development. The strategy employed by the PLAN required limited reach, well within the means of a capable conventional force.

Factional interests had significant impact on Project 09, but the form of this impact was detrimental to progress. Political power struggles constantly shifted organizational control and caused delays. After Project 09 was placed under the military structure, the program placed on an even keel and factional interests became less influential. Technological momentum could never have existed as there was no base from which to begin and the difficulties encountered could have easily shut down development.

Institutional theory and the creation of "norms" placing "value" upon a system begins to fill this gap. The PRC leadership viewed the nuclear submarine in this manner. With the Soviet refusal for assistance, Project 09 began as a drive for self-reliance and as a means to close the gap with the emerging superpowers. The lower priority now placed on follow-on nuclear submarine designs also leads me to the institutional argument as a motivation for initial development. With the capability established, further designs will provide less attention in the international system. The new focus on a "blue water" navy has redirected that attention to keep China in the forefront. As the PLAN modernizes and

fills in the gaps in its force structure, there may again be an emphasis on the submarine programs, both nuclear and conventional.

IV. JAPAN

A case study of Japanese submarine development differs from the previous studies of India and China in that Japan began the process with an existing submarine tradition and the experience which accompanies that tradition. This study is limited by the lack of naval nuclear propulsion developments to provide comparison with conventional submarines. The remainder of the study's design is similar to the previous chapters.

Japan had developed one of the world's leading navies entering the Second World War. Japan integrated submarines into its strategy as a means of creating layers of defense to hinder the advance of the U. S. Navy. Throughout the war, the Japanese rules of engagement restricted the operations of its submarines by giving low priority to merchants as targets of opportunity and focusing on naval engagements. The defeat of Japan changed the status of the Imperial Navy forever. At the end of 1945, over 125 submarines had been lost and the remainder of the Japanese fleet had been sunk, scrapped or surrendered. The U.S. and British fleets used these units for target practice and weapons testing. The Chinese and Russians added them to their fleets. The outcome of the Second World War set the framework under which Japan would later rebuild a submarine fleet.[91]

Established in 1947, Article Nine of the Japanese constitution has been debated since its creation and remains a sensitive topic for both Japanese and Americans. The original intention was to restrain the re-emergence of Japan as a military power.

> Aspiring sincerely to an international peace based on justice and order, the Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as a means of settling international disputes. In order to accomplish the aim of the preceding paragraph, land, sea, and

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[91] Wheeler, *War Under the Pacific*, 155.

> air forces, as well as other war potential will never be maintained. The right of belligerency of the state will not be recognized.[92]

The emergence of the cold war forced the United States to rethink its position on the strength of Japan. During the confusion of the first weeks of the Korean War, the U.S. Occupation forces decided to organize the National Police Force to preserve peace within Japan. The name was changed in 1952 to the National Safety Force, and again in 1954 to the Self-Defense Forces.[93] Some interpretations of article nine would prohibit any type of military forces, however the predominant viewpoint recognized the need for a defense capability. Within evolving interpretations, the Japanese Maritime Self Defense Force (JMSDF) has grown under Article Nine's restrictions into one of the world's most modern naval forces. JMSDF force structure has been created to protect Japanese interests in the surrounding waters, but in a form unlike any coastal navy. Agreements with the United States have extended the JMSDF range out to a one thousand nautical mile radius around the Japanese islands, emphasizing anti-submarine warfare and escort capabilities.[94] The acquisition of power projection vessels is still restricted. Today, the JMSDF is a well balanced fleet with submarines representing over twenty percent of current forces.

A. RESTORATION OF JAPANESE SUBMARINE DEVELOPMENT

Under constitutional restrictions, naval development needed to respond to objective threats in order to justify defensive expenditures. The ASW mission fit this role very well. The destroyers built as a part of the first five year plan were split between ASW vessels and escorts. In 1960, the *Oyashio* diesel-electric submarine was the first submarine

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92 Constitution of Japan, Article Nine (1947) quoted in Malcolm McIntosh, Japan Re-Armed, (New York: St. Martin's, 1986):

93 Malcolm McIntosh, *Japan Re-Armed*, (New York: St. Martin's, 1986): 31.

94 Ibid., 35.

built in Japan since the war.[95] These early developments indicate an intention to go beyond coastal defense and to cover the emerging ASW threat in the region represented by the Soviet Union.

Submarine design and construction continued on a steady basis through the sixties. Nine new submarines of two new designs were built. Four *Hayashio* submarines expanded upon the previous design to improve seaworthiness and propulsion. Five submarines of the *Ooshio* class then followed with new improvements in sonar and electronics. The surface fleet followed suit with additional ASW designs maintaining a modern, balanced ASW force.[96]

Before the *Hayashio* and *Oyashio* submarines could reach twenty years old, they were mothballed and replaced by new designs. The continuity of the design and construction programs produced an additional two submarine classes in the next decade. Seven hulls of the *Uzushio* class were completed, of which two remain in service today. This design was the first Japanese submarine to use a double hull for added strength and a teardrop shape for lower hydrodynamic resistance. Between 1976 and 1980, this class was enlarged and designated the *Yuushio* class submarine. The *Yuushio* incorporated a towed array sonar and was the deepest diving design to date. By 1980, Japan's ASW forces, combining submarines and ASW destroyers comprised over half of the Japanese Maritime Self-Defense Force.

After 1987, Japan produced its sixth and seventh new designs in under thirty years. The *Harushio* represented improved noise reduction, towed sonars, and wireless aerials, as well as anachoic coating. Five hulls of this class are complete and two additional are under construction. The improved version of the *Harushio* is also under construction which will incorporate a large flank sonar array. Later hulls of this class are expected to be

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[95] *Jane's Fighting Ships 1961-62*, (London: Jane's Fighting Ships Publishing, 1961): 144.

[96] Ibid., 144.

equipped with Sterling engine AIP, which is being tested by the Technical Research and Development Institute.[97]

The current JMSDF is one of the world's most modern navies. In terms of submarines, the Japanese match well in capabilities against the primary conventional designs sailing today's oceans. Some of the electronics packages may even be superior to the world's top export products, but cannot be compared as they cannot leave Japanese hands.[98] Japanese success in design and production of submarines can be attributed to the continuity of the building program. For over two decades, ship-builders have produced a minimum of one platform per year. The designs have been upgraded seven times since the restoration of building in 1960. The program's overall intent is to maintain this production pace and retire older platforms after only sixteen years of service. This process keeps maintenance costs low by preventing the need for major overhauls and upgrades, while sustaining continuous modernization. The only setback is the damage to construction facilities from the Kobe earthquake in 1995 which may slow construction and require older hulls to be maintained beyond the planned decommissioning.[99] The possible expansion of the submarine fleet would likely only occur with redefined mission parameters and a total naval expansion. This possibility will be discussed later in this chapter.

A nuclear submarine program was considered by Japan in the early days of the cold war. On 5 May 1959, the Director of the Japanese Defense Agency confirmed early studies on the possibility of a nuclear propulsion program.[100] Possible explanations for the nuclear program not being developed include its high cost, constitutional restrictions and

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[97] Richard Sharpe, ed., *Jane's Fighting Ships 1994-95*, (United Kingdom: Jane's Defence Data, 1994): 351.

[98] McIntosh, *Japan Re-Armed*, 52.

[99] *Jane's Fighting Ships 1995-96*, 351.

[100] *Jane's Fighting Ships 1961-62*, 144.

the ability of the conventional fleet to adequately cover areas patrolled by the JMSDF. Another possible impact on the decision not to proceed with a nuclear program may have been signals from U.S. sources indicating that nuclear propulsion was not needed by Japan and that U.S. assets would be available if the requirement arose.[101]

B. TESTING THE HYPOTHESES

1. National Security - Threat Based

The missions of the JMSDF are restricted by the Japanese constitution in order to maintain a defensive posture. Japanese economic success has created a vast range of interests for Japan. "The prosperity of Japan is therefore dependent on the security of her sea lines of communication (SLOCs) with the United States, with Australasia and South-East Asia, with the Indian subcontinent and Europe, and with the oil-producing countries of the Gulf."[102]

The JMSDF is divided into four escort flotillas and five district flotillas plus two submarine flotillas. Coastal defense is the responsibility of the districts centered around five major naval bases. Coastal forces must protect over twenty-nine thousand kilometers of coastline and twenty-one major ports.[103] One characteristic that separates the JMSDF from other small or medium navies is the lack of fast attack craft and patrol boats. The coastal defense mission is carried out by the larger platforms at a greater distance from shore.[104]

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[101] U.S. submarine presence has been indicated by the stationing Submarine Group Seven in Sasebo, Japan. This is one of only two Groups stationed overseas.

[102] John Jordan, "The Japanese Maritime Self Defence Force," *Jane's Intelligence Review* (February 1992): 59.

[103] *CIA World Factbook 1995*, via Internet (www.odci.gov/cia).

[104] Joseph R. Morgan, "Porpoises Among the Whales: Small Navies in Asia and the Pacific," East-West Center Special Reports (March 1994): 30.

The reach of the submarine and escort flotillas extends well beyond the standard EEZ out to a one thousand nautical mile radius in accordance with the Japan-U.S. communiqué. In May 1981, President Reagan and Prime Minister Suzuki agreed to the increased defense responsibilities "in Japanese territories and its surrounding air and sea space."[105] This range encompasses Russian strategic access points to the Pacific and extends southward to Taiwan. Beyond these limits, Japan relies upon the U.S. Navy to protect its overseas interests.

Japan's National Defense Program Outline prescribes the requirements which the JMSDF must fulfill. One fleet escort force must be available as a rapid response unit. A surface anti-submarine force of one ship division must be operationally ready in each naval district. Submarines, anti-submarine helicopters and fixed wing units, and mine-sweepers must be maintained for surveillance and defensive missions around Japanese ports and major straits.[106]

For this study, Japan's perception of maritime threat is assumed to stop at the one thousand mile marker, though obviously Japan's perceptions do not have a mileage limit. The threat within this radius is considered to be primary in shaping Japan's naval force structure. The perceived threats of Japan are similar to the regional concerns of the United States, but for different reasons. The Japanese Defense Agency (JDA) publishes *Defense of Japan* each year laying out the general strategic plans of the JDA.[107] As the cold war subsided, regional changes have impacted this document, but the primary nations being watched remain the same: Russia, China and North Korea.

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105 "Japan-U.S. Communiqué" in Japan Times (10 May 1981) quoted in McIntosh, Japan Re-Armed, 52.

[106] Japan Defense Agency, *Defense of Japan*, (Tokyo: Defense Agency, 1994): 79.

[107] Japan Defense Agency, *Defense of Japan*, (1994): v. English translation available through Japan Times Ltd.

a. Russia

The history of the cold war and the proximity of the large Russian naval base at Vladivostock have shaped the perceptions of Japan. Whether the Soviets were an overt threat or one imposed by the United States, Japan accepted it and planned based on that premise. The Soviet Navy was not only larger in total numbers, but operated the largest submarine fleet in the Pacific including up to thirty ballistic missile submarines and ninety attack submarines. The geo-strategic position of Japan, around Russian access to the Pacific, placed these navies in position to have frequent contact with the other. Soviet naval and air activity in the Pacific has typically encircled the Japanese islands, and since 1978, Soviet troops have been positioned in the disputed Northern territories.[108]

Even though the official line stated that the Soviet Union was only a potential threat and an invasion was unlikely, Japan could not ignore the Soviet armaments in Eastern Asia. Today's political instability in Russia lessens the threat to Japan further but relations are still strained particularly while these nations remain in dispute over the Kuril islands seized by the Soviet Union in 1945.[109] For Japan, the Russian fleet cannot be disregarded, because as it declines in size, its quality is being upgraded.[110]

b. China

The cultural ties between Japan and the Chinese mainland have not prevented an historical animosity between these nations. Both countries desire to be the preeminent power in Northeast Asia creating tension and suspicion on both sides. Throughout the cold war, China was considered to be pre-occupied with the Soviets, thus minimizing the potential threat.[111] China's current growth and naval build-up are a concern

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[108] Japan Defense Agency, *Defense of Japan*, (Tokyo: Defense Agency, 1982): 32-35.

[109] Edwin O. Reischauer and Marius B. Jansen, *The Japanese Today - Change and Continuity*, (Cambridge: Belknap, 1995): 365, 419.

[110] Japan Defense Agency, *Defense of Japan*, (1994): 33.

[111] Japan Defense Agency, *Defense of Japan*, (1982): 36.

for Japan. While the probability of a direct conflict is not high, conflicting Japanese and Chinese interests are likely to lead to confrontation. The PLAN would likely think twice about directly facing a technologically superior JMSDF. However, the resurgence of Chinese naval action in support of Chinese claims elsewhere could indirectly conflict with Japanese interests. Because the restrictions of the U.S.-Japan security agreement prevent JMSDF involvement beyond one thousand nautical miles, Japan must depend on the U.S. Navy to protect its interests. The relations between the United States and PRC then become a factor in Japanese security interests.

c. Korea

One other historical adversary for Japan has not yet been mentioned, North Korea. Japanese relations with North Korea are less than confrontational, but the military capabilities of North Korea are only suited to strike two possible areas, South Korea or Japan. The situation on the Korean peninsula has had limited impact on the make-up of the JMSDF, but would need to have been factored into Japanese strategic planning. Even the possibility of a conflict between the two Koreas would have feedback into the Japanese system due to links to the United States and hence South Korea. The 1994 tensions over North Korean nuclear weapons production caused Japan to consider how its forces would be involved if a conflict occurred on the peninsula.[112] With the possibility of Korean unification, Japan would be forced to rethink its position considering the resulting U.S. involvement on a unified peninsula. Outside of the U.S. presence in East Asia, Japan has historically perceived Korea as a "dagger pointed at the heart of Japan."

d. United States

Past JMSDF development does not use the United States as a threat, but rather as a model due to close security ties. If the U.S.-Japan security arrangement breaks down, the perceptions of Japanese planners would change. A U.S. withdrawal from East Asia would require Japan to reevaluate the missions of the JMSDF. Japanese forces would

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[112] Japan Defense Agency, *Defense of Japan*, (1994): 34.

be stretched thin in order to fully cover Japan's global interests, and the economy heavily burdened until force structure expansion could be completed. One key to extending the reach of the submarine fleet would be the transition to a nuclear powered submarine. The technical base to make this leap currently exists in Japan.[113]

e. Analysis

The size and capability of the Soviet submarine fleet forced Japan to take heed of the undersea threat with or without U.S. protection. U.S. submarines were not quantitatively sufficient to maintain a steady surveillance of the waters around Japan. Based solely on the Soviet submarine threat, the reemergence of Japanese submarine development can be justified. China and North Korea may have been more overt threats, based on intentions, but the military capacity to directly impact Japan has been limited in both cases. The submarine fleets of China and North Korea lacked the sophistication to keep up with the modernizing Japanese submarines. Only the numerical superiority of the Chinese *Romeo*s could possibly overcome the technologically superior JMSDF ASW forces.

Japan's place along side the United States in the cold war provides justification for the type of development for a submarine fleet. As economic interests gained importance, the Soviet threat was relatively diminished, but the U.S. Navy still had to be relied upon outside Northeast Asia. The restrictions of the constitution and security agreement inhibited the restoration of a fleet comparable in size to the pre-war fleet. Within these restrictions, the diesel submarine program with a fleet of eighteen hulls and a continuous building program, provides solid coverage of Japanese waters without being constrained by maintenance cycles. The result is one the world's top submarine fleets. As the relationship with the United States changes, the economic interests will gain in relative influence over submarine developments.

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[113] "Research and Development of Nuclear Ships," Japan Atomic Energy Research Institute via Internet (www.jaeri.com).

2. Factional Interests

At the heart of the Japanese decision making system lies factionalism. There are volumes describing the factions controlling the political system and how the real power base is actually at a level behind the elected leadership. The question for this study is whether the factional power behind the general decision making has also shaped the development of military force planning and the submarine construction program.

The political arena in Japan is characterized by quick turnovers. The average time that a Prime Minister spends in office is about two years. The cabinet ministers hold their positions for an average of one year, allowing them time to do little more than institute general policies. The Defense Agency is a part of this group, but with notably less power than its counterparts in the cabinet.[114] Thus, the attitudes and biases of the political leadership have a much larger impact upon defense issues. Throughout the constant turnovers, the Liberal Democratic Party (LDP) has remained the party in power. Therefore, the changes which did occur were minor compared to the possibilities if opposing parties repeatedly traded control.[115]

One notable characteristic of Japanese society alters the dynamics of a system permeated by factionalism. Hierarchy and consensus building play important roles in Japanese decision making. "While there may be policy conflicts between subdivisions or factional groups within a ministry, each ministry develops its own policies on controversial issues and fights for these in competition with other ministries and even with the party in power."[116] Consensus building may lead to a compromise, but the hierarchy will determine who holds the power over the final outcome.

The two largest influence groups outside of politics are public opinion and big business. Public opinion runs from nationalistic to pacifistic in the debate over the legality

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[114] Reischauer and Jansen, *The Japanese Today*, 253-4.

[115] Joseph P. Keddell, Jr., *The Politics of Defense in Japan*, (Armonk: M.E. Sharpe, 1993): 180.

[116] Reischauer and Jansen, *The Japanese Today*, 254.

of self-defense forces. In general, the impact of public opinion on the military has been to slow force structure growth. Industry is also a powerful force within Japan, but when related to defense, the export restrictions and budgetary limits restrain the profitability of defense industry. Therefore, it is unlikely that this faction has had significant impact on the submarine program in the past.

One last faction, by a stretch of the definition, would be the United States, represented by the pressure placed upon Japan over security issues. This is one faction which would positively push for submarine developments in an effort to improve the U.S. position. "Japanese defense policy has been designed more to manage conflicting U.S. and domestic pressures than to relate to the international balance of forces."[117] Although for different reasons, the resulting submarine fleet met a portion of U.S. desires and fit Japanese security needs. Thus, factional interests have been a consistent influence throughout fleet development, but can only be considered an underlying factor for submarine development.

3. Technological Momentum

The technological momentum argument may tell a part of the story for the conventional submarine development in Japan. The building process reemerged from a dormant program whose origins predate the Second World War. The evolution of the Japanese submarine through seven designs in thirty years creates a possible link to the overall technological development of the Japanese economy, but does not appear to be an overwhelming impetus.

The likely scenario ties the economic development to design improvements through industrial evolution. As the Japanese economy evolved through the industrial and into high technology, these advances translated into improvements in submarine and system design upgrades. In reverse of trends elsewhere, civilian technologies were turned

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[117] Keddell, *The Politics of Defense in Japan*, 170.

around for dual use in military equipment.[118] The strength of the economy and the planning of the JMSDF allowed it to maintain a continuous construction program which could incorporate design modernization. This hypothesis has the ability to fit the scenario but does not stand well on its own when other explanations are equally convincing.

4. Institutional Theory - Status, Norms and Identity

As described in Chapter I, the strength of the institutional argument is based heavily on the relative strength or weakness of the other hypotheses in illustrating the motivations for submarine development. Similar to the previous case studies, Japan's conventional submarine development is strongly influenced under the national security hypothesis. Therefore, in this section I lay out the main points on why institutional theory is difficult to use as a major influence in this case study.

First, submarine development in Japan resurfaced in 1960. Japan had a previous submarine tradition on which to base its rebuilding program. In other words, Japan had submarines before submarines were "in." This period was primarily dominated elsewhere by the new deployments of the nuclear submarines. Conventional platforms were seen as diminishing in military value. Japan declined to make the jump to nuclear propulsion in order to join the "major" navies. There may have been varied reasons why Japan did not make this step in 1959, but since then Japan has developed the technology needed to complete the task and has declined to do so. Lastly, the rhetoric surrounding the JMSDF lacks any evidence of submarines being over-stressed. The doctrine and force planning of the JMSDF has created a well balanced fleet capable of carrying out multiple missions with a variety of platforms. Submarines are not the only platforms which can complete an ASW mission. No single platform type has been the center of the JMSDF.

Japan's perception of its role in the world relies heavily upon a peaceful outward appearance. The importance of Article Nine to the Japanese tends to downplay the "value"

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[118] McIntosh, *Japan Re-Armed*, 51.

which a military platform could provide. As a means of reflecting identity, Japan focuses on economic success also limiting the ability of a submarine to reflect this.

Institutional theory may provide some insight into the resistance to nuclear developments within Japan. Japan's view of itself as the sole victim of nuclear attack has given it a unique identity within the international culture. All nuclear advancements have met with resistance, but those which are able to portray peaceful uses have slowly been accepted. Initial plans for the *Mutsu*, a nuclear propelled surface vessel, were postponed because of perceptions. Due to the non-military links, this program was slowly accepted and became reality during the eighties. For a nation with this perception of of its identity, a nuclear submarine would tend to hold negative "value."

C. CONCLUSION

The motivations for submarine development in Japan can be explained through national security issues with factional and technological influences as secondary factors. The Soviet submarine fleet, with upwards of 125 platforms, presented a clear and present danger to Japan and its maritime interests. This threat has lessened, but not disappeared. Submarine development was also influenced by factions including U.S. pressure. Opposing factions were able to limit the development through interpretation of the constitution and by imposing budgetary limits on defense expenditures. Economic capacity and technological capacity grew separately from the military, but led to opportunities for submarine improvements which may not have otherwise available.

Without the presence of a significant security threat, the future of the JMSDF and its submarine fleet will depend upon the factional power struggle within the conservative wings. If the U.S.-Japan security alliance should breakdown, the JMSDF will be tasked to cover much larger obligations, now entrusted to the U.S. Navy. This situation would require the effective elimination of Article Nine along with the one percent of Gross Domestic Product limitation on defense budgets. The industrial base in Japan is capable of

accelerating production to compensate, but at a significant cost to the Japanese economy. One predicted force structure would be based around a U.S. model in order to fit shared technology. Primary forces would be centered on a surface fleet. Eventual leaps to nuclear propulsion and aircraft carriers would be the heaviest burdens to bear, but are well within the Japanese capability.

V. RESULTS AND IMPLICATIONS

Security relationships in the Asia-Pacific region are experiencing a period of uncertainty in terms of the future. By examining the motivations for submarine acquisitions, it is possible to make some predictions on this piece of the force structure puzzle. Japan and China provide a long term background of submarine development under very different circumstances. India stands closer as a model for the newer expanding navies, due to the late push for indigenous construction.

The point of departure for this study is the increased emphasis on submarines in naval force structures throughout Asia. Of the nine navies that possess submarines, eight are currently modernizing their fleet. South Korea has joined this group in 1992. Singapore will be added when it receives the contracted hulls from Sweden, and Malaysia is training crews in preparation for acquisitions which are on hold. The acceleration in the overall trend will not likely continue well into the twenty-first century and may level off or merely appear as a statistical bulge. However, once these nations have committed to operating submarines, this undertaking will not be easily discarded. Even if this decade is just a "bulge," strategic planners could then predict the recurrence of this phenomenon when today's submarines come up for replacement in about twenty years. Although undersea warfare seemed to disappear with the cold war, the submarine's widespread acceptance as a naval component indicates greater likelihood of future undersea conflict. Additional submarines in the region lead to greater uncertainty as to the threat and hence, the greater need to control the undersea environment.

A. CONVENTIONAL SUBMARINES

The conventional submarine has become a widespread component of naval force structure. The most common vessels operated are the Russian *Kilo* and German

Type 209. These designs are available on the export market at reasonable cost and to any nation willing to negotiate with the builders. *Type 209* design specifications have been included in the contracts for India and South Korea leading to construction programs in each of these nations. A license to build the *Kilo* is also expected to be sold, with the likely licensee being China, a 1995 buyer. The question at hand is why these submarines are being bought.

The national security hypothesis is the prominent explanation for the conventional submarine program in each of the preceding case studies. Japan faced a direct submarine threat from the Soviet Union for three decades. The security relationship with the United States then helped to shape the response focusing Japan on conventional platforms. For India, the submarine was the most cost-effective platform to provide the needed strength to maintain superiority over Pakistan and meet the emerging challenge of China. Conventional submarines also met one of China's perceived security needs, but from a different angle, by providing an additional layer of defense against an aggressive superpower, while also creating a potential threat to China's neighbors. Security issues are present across the board, but the submarine is not used in the same manner to respond each threat. Japan focuses on the ASW aspect. India uses the submarine for defense of the Indian Ocean and China originally created an offensive capability to generate counter-threat. Therefore, even though national security appears to be overall driving factor in conventional submarine development, as the threat evolves, the submarine fleet should be expected to evolve in response.

In each case study, other forces existed in shaping the submarine fleets. Most factional interests were generally in line with national needs, thus supporting the first hypothesis by not placing the faction's priority above the nation's. India's shipbuilding industry is one example. The program remained at a level commensurate with national needs vice expanding beyond them. In contrast, the conduct of opposing factions tends to limit a program. For example, China's political turmoil had nation-wide impact, yet the construction of the *Romeo* class submarine continued through the Great Leap Forward

and Cultural Revolution. Factions of Japan's population and political entities are pacifistic in nature, yet the JMSDF is continuously modernized to meet the evolving security needs of Japan. The limited efforts of these factional interests to curb submarine development can then be used to show how the security need overrode the factional interest. In general, factional interests are most influential during the formative years of submarine development. Once the program is well established, this factor diminishes.

The technological momentum argument contributed little in explaining conventional acquisitions. In each case, the ship building capacity had to be expanded from a limited surface combatant infrastructure to accommodate submarines rather than emerging as a logical progression. Both India and China established nuclear propulsion programs prior to solidifying the construction infrastructure. Japan's submarines have weak ties to this hypothesis. Commercial technological improvements translated into submarine applications, but there is not a direct link create a need to design a new submarine.

Institutional theory, by the methodology of this thesis, was difficult to apply to the conventional programs. Each conventional submarine fleet held strong motivations under the first two hypotheses, thus eliminating the choice of "institutional value" as the principal motivation. This does not say that conventional submarines cannot fit this mold. The submarine remains a low cost platform providing recognized power which for smaller navies can symbolize modernity.

As an overall trend, national security based on perception of threat is the primary indicator for the acquisition and modernization of conventional submarines. I expect submarine acquisitions to continue into the next century and tail off as the Asian submarine fleets grow in size. If the security relationships throughout Asia can be stabilized to reduce regional tensions, then the trend may level out completely. If tensions grow, then the undersea environment will become increasingly important resulting in larger, more sophisticated fleets. In turn, the ASW technologies will be infinitely more valuable to all navies.

B. NUCLEAR SUBMARINES

The motivations for Indian and Chinese nuclear propulsion programs were not only different from each other, but were unique when compared to their conventional counterparts. Following the lease of the Soviet Charlie-I, India's naval nuclear desires became well known. The primary factor in evaluating India's program is the lack of a strategic vision beyond the Indian Ocean, particularly in the early years of development. India's main desire has always been to control its own destiny in the Indian Ocean. The conventional program addressed this need and has the capability to expand. The Indian nuclear propulsion program has developed at a high cost to the government and with limited strategic return to the military. Even today, the return on investment is only in terms of international attention. Parallel to the lack of security justification, the Bhaba Atomic Research Center (BARC) controlled the nuclear propulsion in a manner to further its own needs, even at a cost of setting back the program. The state's acceptance of BARC's control coupled with a low cost strategic alternative led to the evaluation of the institutional hypothesis. India places a high priority on its nuclear propulsion program. Indian naval rhetoric has centered on both the aircraft carrier and nuclear submarine until recently when the nuclear program has been promoted even at the cost of other strategic assets, including replacement carriers. The key point to evaluate is that India has continued to push for the large ticket item while the threats in the Indian Ocean have changed very little.

China's nuclear submarine program was also shaped by factional and institutional motivations. As a possible third superpower, China may have been able to justify its nuclear programs based on security needs, but the PLAN lacked all complementing ASW forces. The undersea threat of the cold war cannot explain China's slow leap to the nuclear submarine club. Political factions within the PRC struggled over the organizational control of Project 09. This generally caused delays. After the Soviet Union refused to assist China with nuclear submarines, the PRC leadership developed an attitude that the process must be undertaken. Mao went as far as to say, "[China] will have to build nuclear

submarines even if it takes us 10,000 years!"[119] (Luckily it did not take that long or the technology gap would have been huge.) Like India, China's lack of strategic doctrine to accompany the nuclear submarine's deployment points to the impact the submarine's value had on shaping the nuclear submarine program.

Comparison of China and India indicates the strength of an institutional theory for Asia's nuclear programs as well as the influence created by factional interests. However, these cases nothing alike. Indian factions pushed the program to get it started, while Chinese political power plays delayed development. For China, the nuclear submarine represented a structural role of equality with the great powers. On the other hand, India valued the attention drawn from a nuclear submarine program. The limitations of this part of the study is that the conclusions may never be needed to explain future developments. Most navies of this area are highly unlikely to make this next step, with the notable exception of Japan.

These case studies are unique due to their development inside a cold war environment. Japan is the state most capable of adding nuclear propulsion to its navy, but this will not occur until the international structure changes and the U.S.-Japan link is clearly broken. However, if Japan is to add nuclear propelled submarines to its fleet, the motivating factors will be very different from the Indian or Chinese case studies. First, the technological pieces are in place waiting to be assembled. Japan has already proven the capability to the international community with the voyages of *Mutsu*.[120] If Japan were to take this step, it likely would be in conjunction with a greater need to extend JMSDF forces around the globe in support of national interests vice as a symbol of modernity or national identity.

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[119] Lewis and Xue, *China's Strategic Seapower*, 18.

[120] Japan has successfully deployed a commercial nuclear propelled vessel, *Mutsu*. This ship has completed its intended testing in 1991 and will be used in preparing future designs, expected to include a reactor for a submersible research vessel (designated Deep-sea Reactor X). This information is from the Japan Atomic Energy Research Institute via the Internet at www.jaeri.com.

C. IMPLICATIONS

1. Asia-Pacific

These case studies provide a window through which other Asian navies may be viewed in an attempt to understand the make-up of their navies. Of the eight remaining cases, three are just beginning submarine development and four are undertaking modernization. The endpoint of each navy's submarine development will impact the security relationships of the region. The importance of maritime interests will continue to grow with the region's expanding economies. The proliferation of submarines will create further uncertainty and increase the likelihood of submarines being perceived as a threat. The undersea environment will have to be considered in future bilateral and multilateral interactions.

Applying the trends observed in this study to other submarine fleets will not necessarily provide perfect correlation. Most of the newer submarine fleets are beginning with smaller fleets and are not including an indigenous building program to allow for continuous modernization. The motivations for acquiring two to four conventional submarines may be different than the reasons behind building a larger fleet. At this level of acquisition, the conventional submarine may take on some of the social values associated with nuclear submarines, as seen in the China or India case studies. This question is outside the scope of this thesis, but would provide an interesting base for further study.

2. United States

For the United States, the trend is as important as the motivations. More important though is whether the trend will continue. As stated above, based on national security motivations, I believe the trend will continue into the next decade and conventional submarines will be the common factor between Asian navies. These navies will deploy conventional submarines carrying modern weapons systems, primarily in the littoral regions of Asia. The United States, Russia, China and eventually India will have the lock on nuclear submarines in the Pacific. I expect the Indian Navy and PLAN will continue to

focus on each other as a means to justify the cost of nuclear propulsion as it would be difficult to step away from these programs. While attention focuses on the larger navies, AIP equipped submarines will make a debut in the Pacific and will be a challenging piece of the ASW puzzle.

How does this impact the U.S. Navy? The undersea threat is far from gone. This study focused on platform acquisition via purchase or indigenous construction. Equal attention should be paid to the conventional weapons markets which will arm these submarines with modern torpedoes and mines. The United States would have a difficult time in attempting to control the transfer of submarines and submarine weapons systems. Considerations were made over banning submarines after the First World War due to the style of attack, the process failed. With forty-four navies operating submarines today, this is obviously out of the question. The arms market is diversified from the Russian *Kilo* class submarine to the British Tigerfish torpedo and French DUUX-5 sonar suite. Diplomatic pressure may provide some influence on the process, but pressure at one point may only force a buyer to a different market. Efforts in this area can provide only limited returns.

If submarine and submarine weapons proliferation cannot be controlled, then U.S. forces must be ready to counter the undersea threat. ASW operations in the environment around Asia will provide new challenges to all segments of the ASW picture. In order to provide protection to U.S. forces operating in the region, today's ASW efforts will need to be prepared for the smaller conventional threat in the littoral areas. The burden is placed on the navy attempting to conduct anti-submarine warfare. ASW forces need to be significantly larger than undersea aggressors, in order to counter even a small submarine fleet. The Falklands War was a glaring example of this fact.

Familiarity with the littoral operating environment will be key to the success of ASW forces. The only means to gain this experience is through actual operations. Both Japan and South Korea, our strongest Asian allies, are operating modern conventional submarines. Joint exercises between U.S. ASW forces and Asian submarines can provide

invaluable operating time for all crews involved. These exercises can be conducted in difficult ASW environments including shallow regions. Crew experience in these situations cannot be replaced by simulators or team trainers.

In 1990, Admiral James Fitzgerald and John Benedict pointed out other applicable ASW needs. These included torpedo defenses, non-acoustic and shallow-water ASW technologies. They also proposed the need for increased surveillance and intelligence to track small navies' submarines. Knowing where to begin a search significantly increases the odds of locating a quiet submarine.[121] The Pacific Rim is evolving into an area with a high concentration of conventional submarines. These ASW initiatives become imperative if U.S. interests are threatened.

Conventional submarines have become a valuable asset in Asian naval force structure. The current trend of acquisitions is unlikely to turn downward. As long as the security needs of the region's members are threatened, submarines can be expected to be a part of the response. For the United States, the return of an adversary such as the Soviet Union is improbable, but the much less predictable threats are here to stay.

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[121] Fitzgerald and Benedict, "There is a Sub Threat," 59.

BIBLIOGRAPHY

General Theory:

Eyre, Dana P. and Mark C. Suchman, "Status Norms and the Proliferation of Conventional Weapons, An Institutional Approach," in Peter J. Katzenstein, ed., *Culture and National Security* (Columbia University Press, forthcoming).

Keohane, Robert O., ed. Neorealism and its Critics (New York, Columbia University Press, 1986).

Powell, Walter W. and Paul J. DiMaggio, ed. The New Institutionalism in Organizational Structure (Chicago, University of Chicago Press, 1991).

Scott, Richard W. and John W. Meyer and Associates, Institutional Environments and Organizations (Thousand Oaks, Sage Publications, 1994).

General Submarines and Asian Navies:

"Anti-submarine Warfare in the Third World," *Jane's Intelligence Review* 6, no. 4 (April 1994).

Breemer, Jan S., *Soviet Submarines - Design, Development and Tactics* (United Kingdom: Jane's Information Group 1989).

Byron, John L., "Submarine," *International Military and Defense Encyclopedia,* Vol 5. (Washington: Brassey 1993).

"CIA World Factbook," via Internet (www.odci.gov/cia).

"Creating a Submarine Force the French Way," *Asian Defence Journal* (August 1989).

Dantes, Edmond, "Naval Build-up to Continue Unabated - Part I, II" *Asian Defence Journal* (March, May 1992).

de Liones, Andres, "Anti-Submarine Warfare in the Third World," *Jane's Intelligence Review* (April 1994).

Douglas, Martin, "Navies of the Far East," *Naval Forces*, 12, no. 2 (1991).

"Submarines for the Third World," *Naval Forces* 14, no. 6 (1993).

Fairbank, John K., and Edwin O. Reischauer and Albert M. Craig, *East Asia: Tradition and Transformation* (Harvard, Houghton Mifflin 1989).

Fitzgerald, James, and John Benedict, "There is a Sub Threat," *Proceedings* (Annapolis: Naval Institute Press, August 1990).

Friedman, Norman, *Submarine Design and Development* (Annapolis: Naval Institute Press 1984).

Hahn, Bradley, "Sea Lanes Becoming More Vulnerable, More Important," *Asia-Pacific Defence Reporter* (September 1990).

Jane's Fighting Ships 1960-61 (Jane's Fighting Ships Publishing 1960).

"The Kilo Class Submarine," *Jane's Intelligence Review* 4, no. 9 (September 1992).

Lok, J. L., "Singapore, Germany Revive Submarine Talks," *Jane's Defense Weekly* 24, no. 11 (16 September 1995).

Miller, David, "An Inside Look at the U.S. Submarine Community," *Naval Forces* 13, no. 6 (1992).

"The Maritime Importance of the South China Sea," *Naval Forces* 14, no. 2 (1993).

Morgan, Joseph R., "Porpoises Among the Whales: Small Navies in Asia and the Pacific," *East-West Center Special Reports*, No. 2 (March 1994).

Office of Naval Intelligence, "Worldwide Submarine Proliferation in the Coming Decade" (Washington: U.S. Government Printing Office 1994).

Preston, Antony, "Asia-Pacific Navies to the End of the Decade," *Asian Defence Journal* (January 1993).

Segal, Gerald and Digby Waller, "The Economics of East Asian Security," *Jane's Intelligence Review* 7, no. 8 (August 1995).

Sengupta, Prasun, "South East Asian Naval Programmes Parts I-III," *Naval Forces* (1992).

Sharpe, Richard, ed., *Jane's Fighting Ships 1994-95*, (United Kingdom: Jane's Defence Data, 1994).

Jane's Fighting Ships 1995-96, (United Kingdom: Jane's Defence Data, 1995).

Walters, Stewart, "Asia Aims its Sights Underwater," *Asian Defence Journal* (June 1994).

Wheeler, Keith, *War Under the Pacific* (Alexandria: Time-Life Books 1980).

Young, Peter Lewis, "Submarine Procurement: Some Speculations on the Buying of a Submarine," *Asian Defence Journal* (June 1991).

India:

Balaram, K., "India in the 1990's - Defence Compulsions," *Indian Journal of Political Science* 51, no. 4 (October-December 1990).

Bashkar, C. Uday, "The Indian Navy: Rhetoric, Reality and Rationale," *Indian Defence Review*.

"Chinese Maritime Resurgence and India," *Times of India* (20 December 1994).

Bhaumik, Subir, "Bay of Bengal - Emerging Naval Competition," *Indian Defence Review* (April 1994).

Chaudhury, Rahul Roy, "Advanced Technology Submarines for Pakistan: Implications for the Indian Navy," *Strategic Analysis* (December 1994).

"The Chinese Navy and Indian Security," *India Defence Review* (January 1994).

"Germany Loses Indian Subs," *Defense*, Vol. 7 (1988).

Govil, S. P. VADM, IN(ret), "Why the Navy? Its Role and Responsibilities," *Indian Defence Review*

(July 1993).

"Indian Navy - Its Shape and Size," *Indian Defence Review* (April 1994).

Joshi, Manoj, "Desperately Copying Charlie, India Designs Nuclear Submarine," *Times of India* (14 December 1994).

"Ordeal of a Navy Captain," *Hindu International* (3 December 1991).

Tellis, Ashley J., "Securing the Barrack: The Logic, Structure and Objectives of India's Naval Expansion," *Naval War College Review* 43 (1990).

Ward, Michael D. and A. K. Mahajan, "Defense Expenditures, Security Threats and Government Deficits," *Journal of Conflict Resolution* 28, no. 3 (September 1984).

Ward, Michael D, "Military Spending in India, *Defense Economics*, Vol. 3 (1991).

China:

"China continues Ming Submarine Construction," *Jane's Defense Weekly* 24, no. 11 (16 September 1995).

"China's Naval Expansion," *Jane's Defense Weekly* (7 January 1989).

"Chinese Bases in Burma - Fact or Fiction," *Jane's Intelligence Review* 7, no. 2 (February 1995).

Chong-Pin Lin, "Stepping Out - China's Lengthening Shadow," *International Defense Review* (February 1995).

Jacobs, Gordon, "The PLA - From Doctrine to Organizations," *Jane's Intelligence Review* (August 1993).

Jordan, John, "The People's Liberation Army Navy (PLAN)," *Jane's Intelligence Review* (June 1994).

Lewis, John W. and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age* (Stanford: Stanford University Press, 1994).

"The People's Liberation Army - Navy (Chinese Naval Assessment)," *Jane's Intelligence Review* 6, no. 6 (June 1994).

Preston, Anthony, "The Changing Face of the PLA Navy," *Asian Defence Journal* (August 1989).

Ryan, Stephen L., "The PLA Navy's Search for a Blue Water Capability," *Asian Defence Journal* (May 1994).

Shishlevskiy, Valentin, "China's Defence Policy: Redefining Security Interest & Rewriting Military Doctrines," *Asian Defence Journal* (February 1995).

Tai Ming Cheung, "China's Regional Military Posture," *International Defense Review* (June 1991).

Yan Kong, "Institutional Developments in China's Central Military Commission," *Jane's Intelligence Review* (September 1993).

Japan:

"Blue Water Ambition," [Segment of Country Survey: Japan] *Jane's Defence Weekly* (17 August 1991).

Grazebrook, A. W., "Maritime Potential No Cause for Concern," *Asia-Pacific Defence Reporter* (September 1991).

Japan Defense Agency, *Defense of Japan 1982* (Tokyo: Defense Agency, 1982).

Japan Defense Agency, *Defense of Japan 1994* (Tokyo: Defense Agency, 1994).

Jordan, John, "The Japanese Maritime Self Defense Force," *Jane's Intelligence Review* (February 1992).

Keddell, Joseph M. Jr., *The Politics of Defense in Japan* (Armonk: M.E. Sharpe, 1993).

McIntosh, Malcolm, *Japan Re-Armed* (New York: St. Martin's Press, 1986).

Mitsuhisa Mashiko, Defense Policy of Japan Maritime Self Defense Force (JMSDF) in the Early 21st Century" (Masters Thesis, Naval Postgraduate School, Monterey, 1995).

"Research and Development of Nuclear Ships," via Internet (www.jaeri.go.jp).

Shinji Tsukigi, "Internal and External Influences on JMSDF" (Masters Thesis, Naval Postgraduate School, Monterey, 1993).

Tracey, Gene D., "Japan's Naval Forces in the 1990s," *Asian Defence Journal* (May 1990).

Wood, Collin G., "Far East Diversifies Naval Assets as Wealth Grows," *Armed Forces Journal International* (January 1992).

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